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Harry S. Truman Dam and Reservoir, Missouri

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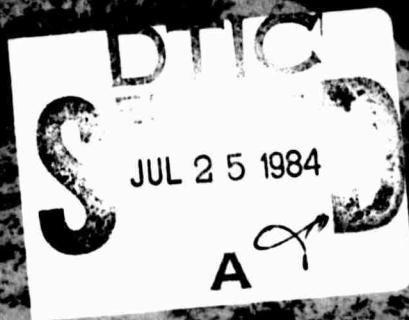
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Cultural Resources Survey Harry S. Truman Dam and Reservoir Project

Volume VIII

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Archeological Survey	Environmental Studies	Deepwater Creek															
Artifact Analysis	Osage River	Tebo Creek															
20. ABSTRACT (Continue on reverse side if necessary and identify by block number) <p>The ten volumes report the results of a cultural resources survey in the Harry S. Truman Dam and Reservoir Project, Henry, Benton, St. Clair, and Hickory counties in southwestern Missouri. The combined volumes relate the findings of historical, architectural, archeological surveys conducted between 1975 and 1977. Volume I contains an outline of Osage River history to serve as a background for historical studies; Volume II is a historical gazeteer. Volume III contains the architectural survey of the reservoir. Volumes IV</p>																	

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through IX report the archeological survey of the reservoir. Volume IV is a description of the archeological survey, the results of that survey, and an analysis of prehistoric settlement-subsistence patterns in the reservoir area. Volume V contains analyses of surface collections obtained during the survey, and includes studies of chipped stone tools, ground stone tools, hematite, ceramics, and projectile points.

Volume VI consists of an interpretation of the Euro-American settlement of the lower Pomme de Terre River valley. Volume VII is a study of the results of preliminary testing at several sites in the lower Pomme de Terre River valley. Volume VIII contains the results of excavations in rock shelters along the Osage River. Volume IX contains studies relating to tests conducted in early occupation sites in the reservoir area, and an analysis of some Middle Archaic materials.

Finally, Volume X contains four environmental study papers, detailing the bedrock and surficial geology, the historic plant resources, and special studies of the soils and geology or portions of the reservoir.

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Russell L. Miller, Stephen A. Chomke, Andrea L. Novick, Charles E. Cantley, Janet E. Joyer, R. A. Ward, T. L. Thompson, C. V. Haynes, F. B. King, and D. L. Johnson.

CULTURAL RESOURCES SURVEY
HARRY S. TRUMAN DAM AND RESERVOIR PROJECT
VOLUME VIII
ARCHEOLOGICAL TEST EXCAVATIONS: 1976

by

Andrea L. Novick
and
Charles E. Cantley

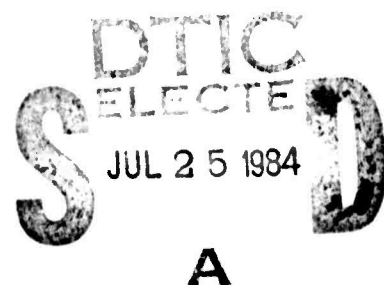
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1983



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REPORTS OF THE
CULTURAL RESOURCES SURVEY
HARRY S. TRUMAN DAM AND RESERVOIR PROJECT

Volume I: CHRONOLOGY OF OSAGE RIVER HISTORY, by Curtis H. Synhorst. 399 pp.

Volume II: HISTORICAL GAZETTEER AND MITIGATION RECOMMENDATIONS, by Curtis H. Synhorst. 340 pp.

Volume III: ARCHITECTURAL SURVEY, by Nanette M. Linderer. 85 pp.

Volume IV: THE ARCHEOLOGICAL SURVEY, by Donna C. Roper. 253 pp.

Volume V: LITHIC AND CERAMIC STUDIES

Part I: Ground Stone Implements, by Michael Piontkowski, pp. 1-25

Part II: Hematite in the Harry S. Truman Reservoir Area, by Deborah E. House, pp. 27-72

Part III: Introduction to the Truman Reservoir Pottery, by Lisa G. Carlson, pp. 73-120

Part IV: Projectile Points, by Donna C. Roper and Michael Piontkowski, pp. 121-268

Part V: A Preliminary Examination of Chipped Stone from Truman Reservoir, Missouri, by David E. Griffin and Michael K. Trimble, pp. 269-349

Volume VI: EURO-AMERICAN SETTLEMENT OF THE LOWER POMME DE TERRE RIVER VALLEY, by Russell L. Miller. 75 pp.

Volume VII: ARCHEOLOGICAL TEST EXCAVATIONS IN THE HARRY S. TRUMAN RESERVOIR, MISSOURI: 1975, by Stephen A. Chomko.

Volume VIII: ARCHEOLOGICAL TEST EXCAVATIONS: 1976, by Andres L. Novick and Charles E. Cantley. 126 pp.

Volume IX: PRELIMINARY STUDIES OF EARLY AND MIDDLE ARCHAIC COMPONENTS

Part I: Preliminary Archeological Investigations at Two Early Archaic Sites: The Wolf Creek and Hand Sites, by Michael Piontkowski, pp. 1-58

Part II: The Distribution of Middle Archaic Components in the Truman Reservoir Area, by Janet E. Joyer, pp. 59-80

Volume X: ENVIRONMENTAL STUDY PAPERS

Part I: Bedrock and Surficial Geology of the Harry S. Truman Reservoir Area, West Central Missouri, by R. A. Ward and T. L. Thompson, pp. 1-21

Part II: Report on Geochronological Investigations in the Harry S. Truman Reservoir Area, Benton and Hickory Counties, Missouri, by C. Vance Haynes, pp. 23-32

Part III: Spatial and Temporal Distribution of Plant Resources in the Harry S. Truman Reservoir, by Frances B. King, pp. 33-58

Part IV: Soils and Soil-Geomorphic Investigations in the Lower Pomme de Terre Valley, by Donale Lee Johnson, pp. 59-139

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Of course this work would have been impossible without our field crew Joel Bleifuss, Edward Fulda, Janet Joyer, and Sarah McAnulty, who also washed all of the material before the end of the field season. Deborah House, the Truman Reservoir Project laboratory

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Although the field work was supported by the U.S. Army Corps of Engineers, the analysis and writing of this report was done by the authors on their own time.

The ceramics from these sites were analyzed by Lisa Carlson and are reported in Volume V.

ARCHEOLOGICAL TEST EXCAVATIONS: 1976

by

Andrea L. Novick
and
Charles E. Cantley

INTRODUCTION

The testing program for the western portion of the reservoir, prepared during the early months of 1976, was scheduled to coincide with the summer field season. Development of the testing program was based on previous research and on six months previous field experience by the authors in the reservoir area. The research design was also integrated with the overall archeological research design of the reservoir area (Roper and Wood 1976).

Six sites tested during the 1976 field season are reported here. Three sites (23SR626, 23SR628, and 23SR631) were discovered by the authors during the survey and were subsequently tested. Site 23SR473 was located by another survey team early in the field season. Although 23SR122 and 23SR127 had been tested in the early 1960s, they were revisited to obtain larger samples of debitage.

A great deal of archeological field work had been carried out in south central Missouri over the past 20

years (Chapman 1975). The University of Missouri conducted extensive archeological survey and site testing in the Pomme de Terre Reservoir (Chapman 1954, Wood 1961) southeast of the Harry S. Truman Reservoir (HST) area. Additional archeological survey and site testing was also carried out in the Stockton Reservoir (e.g., Calabrese 1969) southwest of the study area.

Field work in the Truman Reservoir (formerly known as the Kaysinger Bluff Reservoir) has been continued by the University of Missouri for nearly 20 years. Chapman, working in the early 1960s, directed test excavations for a number of field seasons (Chapman 1965). Several field seasons were spent at the well-known Rodgers Shelter, on the lower Pomme de Terre River (Wood and McMillan 1976). Rodgers Shelter has cultural deposits some 10 meters deep, extending back in time to at least 10,500 B.P. Rodgers Shelter is important for its extensively analyzed cultural sequence and for its position as one of the first prehistoric archeological sites to be placed on the National Register of Historic Places. Wood and McMillan (1976) and their colleagues have summarized a decade of interdisciplinary research along the Pomme de Terre River.

Unfortunately, most of the archeological research in the western portion of the Truman Reservoir has been reported only as preliminary studies (e.g., Chapman 1965). Consequently, a detailed synthesis of the area's prehistory remains to be done. The 1976 testing program, therefore, was developed for the western portion of the reservoir to help fill some of the archeological gaps in our knowledge of Ozark-Western Prairie prehistory.

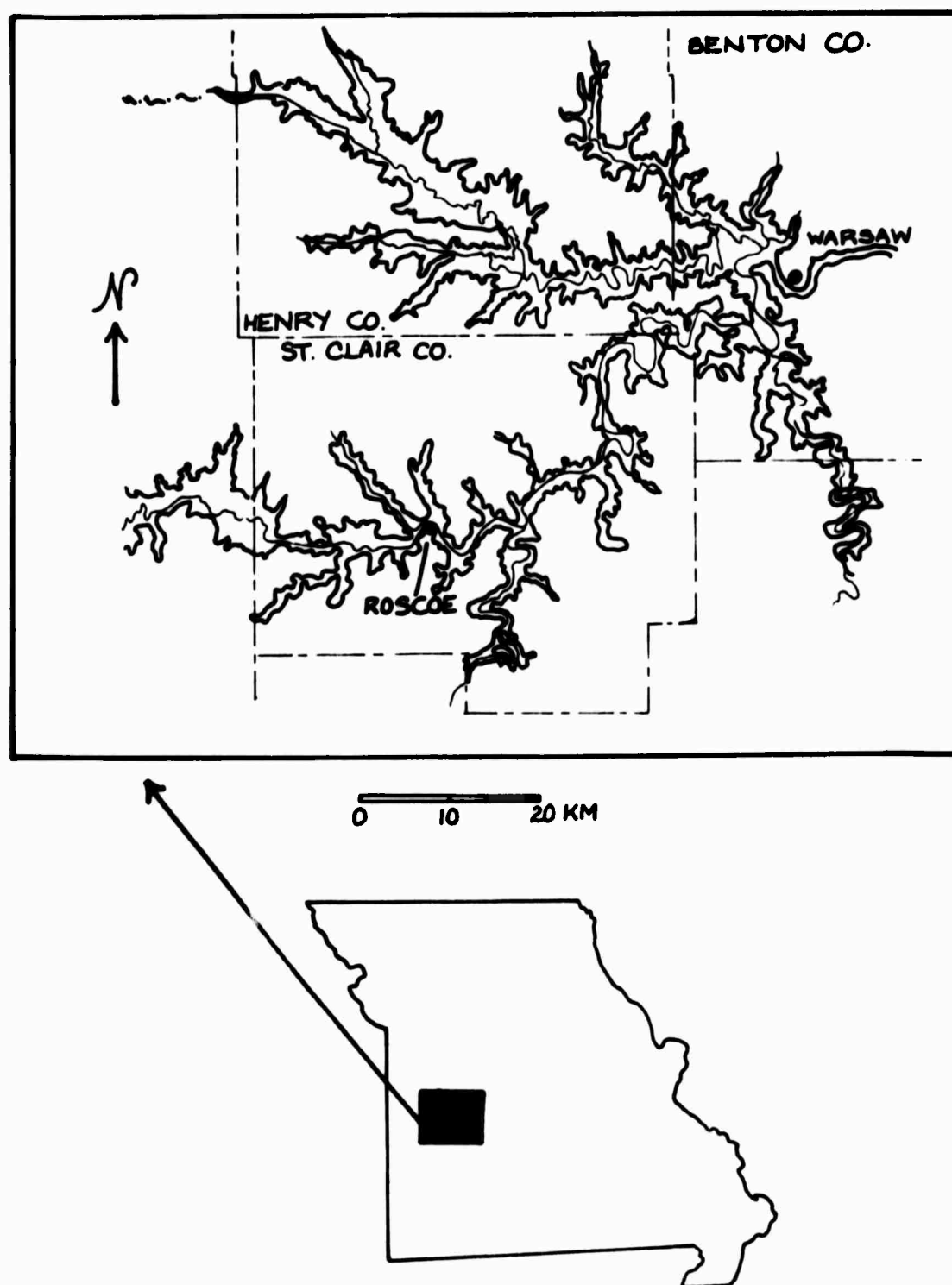


Figure 1. The Harry S. Truman Reservoir area, Missouri.

Historical Background

The first documented interest in Missouri Ozark rockshelters begins (according to oral tradition) with the notorious Younger Brothers; these outlaws roamed St. Clair County in the late 1800s. As a consequence of their activities, rumors began circulating that they buried some of their gold in some of the local rock shelters. No gold has ever been discovered, but interest was transferred to Indian artifacts found in these overhangs - an interest still very much alive today.

Gradually, archeologists too began excavating the rockshelters. South of the study area, in the southern Ozarks, Harrington (working out of the Heye Museum) and Dellinger (of the University of Arkansas) excavated many rockshelters in the 1920s and 1930s (Harrington 1924, 1960). Although they worked a long time ago, they were interested in the same type of subsistence questions that we are still trying to answer today.

Since many of the rockshelters they excavated were dry, plant remains were well preserved. Both Harrington and Dellinger sent their vegetal material to Melvin Gilmore (1931), an ethnobotanist at the University of Michigan Museum, for identification; he had done much work with Indian utilization of plants. Gilmore's letters to Dellinger reflect his strong interest in reconstructing prehistoric plant exploitation patterns:

The more closely all the archaeological material is combed from every site discovered, and the more widely such explorations are carried out, the more we shall have for comparison and the

better we can trace culture migration in pre-historic times ... many archaeologists and ethnologists do not know of the Ethnobotanical Laboratory, or if they know of its existence they do not know what it is doing or can do for them (Gilmore to Dellinger February 3, 1932).

As early as 1931 Gilmore realized the importance of comparative collections for ethnobotany:

I should be exceedingly glad to have a collection of the present indigenous plants of the region.

I should like to have not only the usual herbarium specimens, but also all kinds of nuts, seeds, dried fruits, woods, roots, tubers, etc.

(Gilmore to Dellinger October 7, 1931).

Unfortunately, for some unknown reason, this interest in plants appears ephemeral. Perhaps most of the dry shelters had already been excavated and the small plant remains from subsequent excavations were not recognized by archeologists. The now-common flotation techniques did not come about until the late 1960s.

After this brief effervescence of ecological interest, most studies in Ozark prehistory were culture historical in nature, i.e., artifact typologies and chronologies (e.g., Chapman 1954; Miner 1950) which typified North American archeology about this time. Without this previous work, of course, it would be more difficult for us to ask the ecologically oriented questions that are so common in archeological research today (Smith 1975).

Wood and McMillan (1976) have reported on a decade of interdisciplinary research along the Pomme de Terre River in the eastern portion of the Truman Reservoir area.

McMillan, reporting on his excavations at Rodgers Shelter, summarized his interpretations of prehistoric man and his environment in the Ozarks. A major problem with this research, as McMillan himself (1971: 89) suggests, is that "provenience was not often recorded for the osteological record, thus making it impossible to compare changes and trends in the faunal record with detailed data on artifact changes." Current research on the Rodgers Shelter collections by Marvin Kay will probably be a great help in explaining ecological adaptations and formulating a clear, cultural history of the Ozarks area.

We emphasize that this problem is not unique to Rodgers Shelter excavations of the mid-1960s. Most archeologists were not then as concerned with faunal remains as they are today; scientific problems change with time. Wood's (1968) analysis of Vista Shelter in St. Clair County, Missouri, however, takes an ecological approach. He interprets the shelter as a hunting station of the prehistoric peoples of the Steed-Kisker focus (A.D. 850-1300), as defined at the type site just north of Kansas City (Wedel 1943).

Environment

GEOLOGY

The six sites reported in this study are in the Springfield Plateau, on the western edge of the Ozark Highland. With its rings of eroded strata (McCracken 1961), the Ozark Highland is an impressive feature. The Precambrian granites there are overlain by a series of dolomites, limestones, sandstones, and shales.

All of the rock shelters reported in the present study are on first order tributaries (Horton 1945) or high rank streams.

Virtually all rivers of the Ozark dome work in sedimentary formations and flow from older rocks to younger . . . the maximal erosional removal of the original dome rock has been on the generalized structural summit. Yet, it is here that streams are smallest and can have done the least work . . . (Bretz 1965: 33).

This pattern is most obvious by looking at the geologic map of Missouri (McCracken 1961). There are five major formations in the study area. The two Ordovician formations include the Cotter and Jefferson, which are

dominantly light-brown to brown, medium to finely crystalline dolomite, argillaceous in part.

Lenses of orthoquartzite, conglomerate, and shale are locally present (Allen et al. 1975: 18).

Also within this formation are flawless and oolitic cherts which have been studied by Klippel (1971). The Mississippian Compton formation is limestone and dolomite while the Northview formation is shale and siltstone. All of the rock shelters reported on in this study are located in the Pennsylvanian age Krebs subgroup, composed of interbedded sandstones and shale.

The source for chert poses a problem for archeological interpretations. Although chert cobbles occur in modern stream beds, rounded chert cobbles are also present in very old deposits which are no longer associated with streams.

VEGETATION

Among the major factors effecting the growth of plant communities are bedrock geology and soils. The most common vegetation growing on the limestone and dolomite bedrock are cedar glades, which thrive on the steep slopes and thin, rocky soil.

The vegetational history of the Missouri Ozarks comes from three sources: studies of present day forest types (Segelquist and Green 1968, Segelquist and others 1969); records kept by early Federal land surveyors (Steyermark 1959); and vegetational reconstructions inferred from pollen cores (King 1973, Wright 1971).

Segelquist and Green (1968) defined the upland hardwoods, upland pine-hardwoods, stream-bottom hardwoods, and cedar glades as the major Ozark forest types. The dominant species in the upland hardwoods are oak (Quercus spp.) and flowering dogwood (Cornus florida) (1968: 334). Pines (Pinus spp), oak, flowering dogwood, lowbush blueberry (Vaccinium vacillans), along with various legumes and herbage, compose the upland pine-hardwoods. Stream-bottom hardwoods are dominated by flowering dogwood, oak, and green briar (Smilax glauca). Sedges and ferns are common in the stream-bottom hardwoods with scattered broomsedge bluestem (Andropogon virginicus) and composites. The cedar glades consist of scattered trees in fields of herbs and forbs. The major plants in this community include broomsedge bluestem, panicums (Panicum spp), tickclover (Desmodium spp.); with tree species oak, green briar, sumac, and elm (1968:333).

King (1973: 545), analyzing the modern pollen rain from the central Missouri Ozarks, determined the oak-hickory

forest pollen spectra to consist of "low values of pine, up to 30% Quercus, and high amounts of Ambrosia-type Compositae pollen."

During the 1800s land surveyors usually recorded the four trees in the corner of each intersecting township and range section. Steyermark (1959) has compiled the most extensive volume of early accounts by travelers and surveyors. Specific tree species recorded by the Federal land surveyors include post oak (Quercus stellata), white oak (Q. alba), blade oak (Q. veluntina), blackjack oak (Q. marilandica), hickory (Carya), elm (Ulmus), and birch (Betula). The importance of vegetation relates not only to its potential as food resources, but its necessity to those animals which were in turn hunted by prehistoric people.

FAUNA

Cleland (1960) has analyzed the faunal remains from 58 rockshelters excavated in northwestern Arkansas. From the percentages of animal species within the total number of sites, he suggests specific preferences by prehistoric human populations. These are:

White-tailed deer	(<u>Odocoileus virginianus</u>)	95%
Turkey	(<u>Meleagris gallopavao</u>)	62%
Raccoon	(<u>Procyon lotor</u>)	50%

Smith (1975) has also discussed Middle Mississippi exploitation of fauna in the Mississippi River Valley. He analyzed faunal materials from four sites in southeastern Missouri, one site in northeastern Arkansas, and one site in Tennessee. Smith's (1975: 17) research

centered on three hypotheses dealing with prehistoric hunting strategies. The most important point Smith argues for is the concept of maximization (1975: 43). Prehistoric hunters apparently tried to get a maximum meat yield for a minimum of effort. Like Cleland, Smith found white-tailed deer, raccoon, and turkey were the animals most intensively exploited by prehistoric hunters.

DESCRIPTIVE LITHIC CATEGORIES

The typology used in the classification of the lithic artifacts and debitage has three objectives:

1. The description of the tool assemblage at each site.
2. The observation of variability in technology within and between sites.
3. The inference of behavioral activities associated with the presence or absence of particular morphological attributes in the tool assemblage.

The types of lithic material discussed here are based on petrographic attributes. Klippel's study of chert in the Graham Cave area (1971: 168-176) is one of the best regional references regarding this aspect of lithic analysis. He collected chert samples from all geologic formations, mainly dolomite and limestone, within three miles of Graham Cave. Observations showed that the characteristics of the Jefferson City formation chert included oolites, banding, and absence of fossils. Fossils, mottling, and a brown color were distinctive of the Burlington formation/Kansan till chert. By mapping the natural occurrence of these two types of chert, Klippel was able to suggest where the stone used to manufacture the Graham Cave artifacts had been obtained.

Chipped stone tools were studied for fossils and flaws. The present study of chipped stone tools and debitage revealed oolites, banding, mottling, and fossils, as well as numerous quartz crystal inclusions. The presence or absence of heat treatment was also noted. The criteria used to determine heat treatment — pink or red color, vitreous luster, etc. — are well known

(Crabtree and Butler 1964; Purdy 1971). However, as no experimental heat treatment studies have been conducted on local cherts, we stress that this analysis is only tentative. Both tools and debitage were studied for heat treatment. The best evidence for heat treatment was pot lidding. This distinctive mark is the result of water expansion and pressure fracture brought about by heat. Debitage with pot lidding was studied and used as a guide for heat treatment. It was hoped that this information would be helpful in distinguishing cultural units. That is, perhaps heat treatment of lithic material increased through time from rare use in Archaic times to widespread use in Woodland periods. Unfortunately, this type of question is unanswerable at present. We suggest that lithic collections similar to those of Klippel (1971) be made in the Truman Reservoir and, further, that experimental heat treatment studies be conducted.

The debitage analysis reported here was based primarily on the work of Binford (1963), Crabtree (1972) and White (1963). These authors outline the principles of chipped stone tool technology beginning with the initial cobble, defining stages of reduction, and concluding with finished forms.

Stone tool manufacture has been characterized by Collins (1974:xxix) as a:

linear reductive process which begins with the acquisition of raw materials and passes through one or more steps: initial reduction, primary trimming, secondary trimming, and maintenance or modification after use.

Collins continues by arguing that:

archaeological chipped stone products including debitage, may be identified with the reductive

step which produced them (1974:xxix).

Based on previous descriptions, five classes of debitage were analyzed according to the criteria outlined below (see Fig. 2).

Debitage

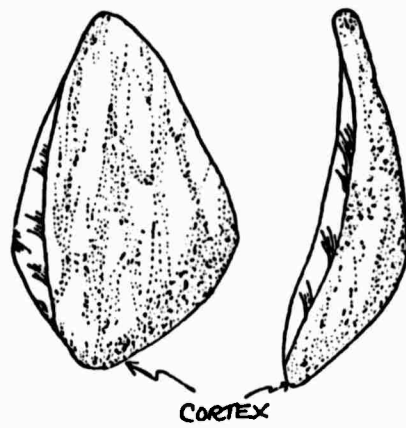
Primary decortication flakes. These are the first flakes struck from a nodule or pebble. Cortex covers at least 90% of the outer face (dorsal surface) of the flake (Fig. 2, a).

Secondary decortication flakes. These flakes are next removed from a nodule or pebble. The outer surface of these flakes may be covered up to 90% by cortex (Fig. 2, b).

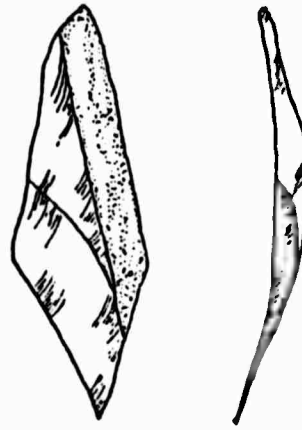
Interior flakes. The absence of cortex along with a relatively thick cross section are the major characteristics of this flake class. Large size and steep platform angle are also observed (Fig. 2, c).

Retouch and thinning flakes. These are the result of the final stages of the bifacial reduction, basal thinning, resharpening and so forth. Many of these appear to be pressure flakes, the rejectage from the final stages of projectile point manufacture. Biface edges are often seen, clear evidence of resharpening. Blade-lets are common in this class. No cortex is present on these flakes (Fig. 2, d).

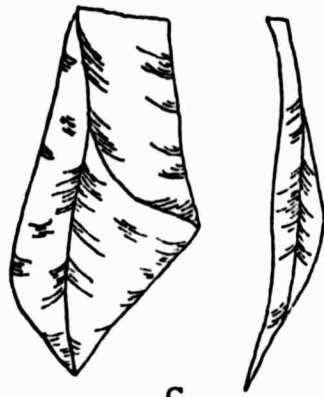
Miscellaneous flakes. Included in this class are the shatter and blocky by-products of cobble reduction. Also included are the broken flakes which cannot be classified into other categories. A flake was considered unclassifiable if it was missing the bulb of percussion or if more than $\frac{1}{4}$ of the projected flake was missing.



a

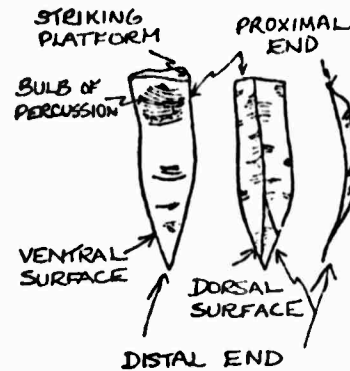
Primary decortication
flake

b

secondary decortication
flake

c

Interior flake



d

Retouch and
thinning flake

Figure 2. Four stages of cobble reduction.

Chipped Stone Tools

Cores are pieces of stone or cobbles from which flakes and blades have been removed. In many cases, chert cores probably served as hammerstones, as evidenced by battering on core surfaces.

Analysis: measurement of maximum length, width, and thickness; weight; check for battering; and check for internal flaws in the material.

Hammerstones. A variety of stones ranging from chert to sandstone are battered on one or more surfaces.

Analysis: same as above.

Distal end scrapers. Flakes which have their dorsal, distal end (opposite the bulb of percussion) retouched to form a beveled working edge. Step fractures are also present. The retouch flaking often covers not only the distal arc, but extends along the parallel edges of the scraper. The step fractures along the parallel edges suggest that these scrapers also served as side scrapers.

Analysis: The measurements of maximum length, width, thickness, and weight were recorded (Fig. 3). Edge angle was measured by placing the scraper (in longitudinal cross section plane) on the polar graph paper. The scrapers were held laterally on the center point of the graph paper, with the ventral (unworked) surface on the central horizontal line, and the distal end on the central vertical line. The edge angle was calculated from the vertical zero (Fig. 4). This technique has been advocated by Wilmsen (1970). Platform preparation, presence or absence of cortex, and type and quality of lithic material were noted.

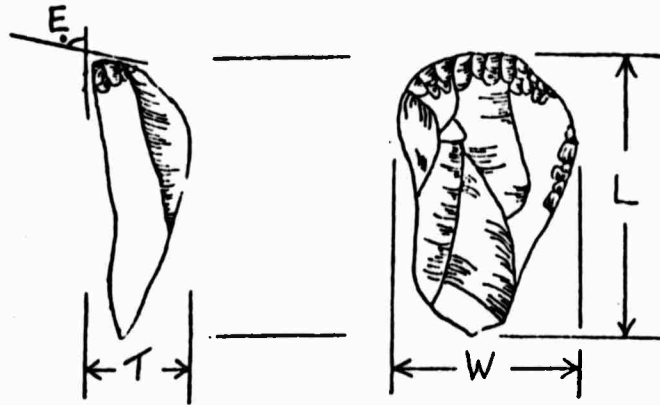


Figure 3. Measurements taken on scrapers.

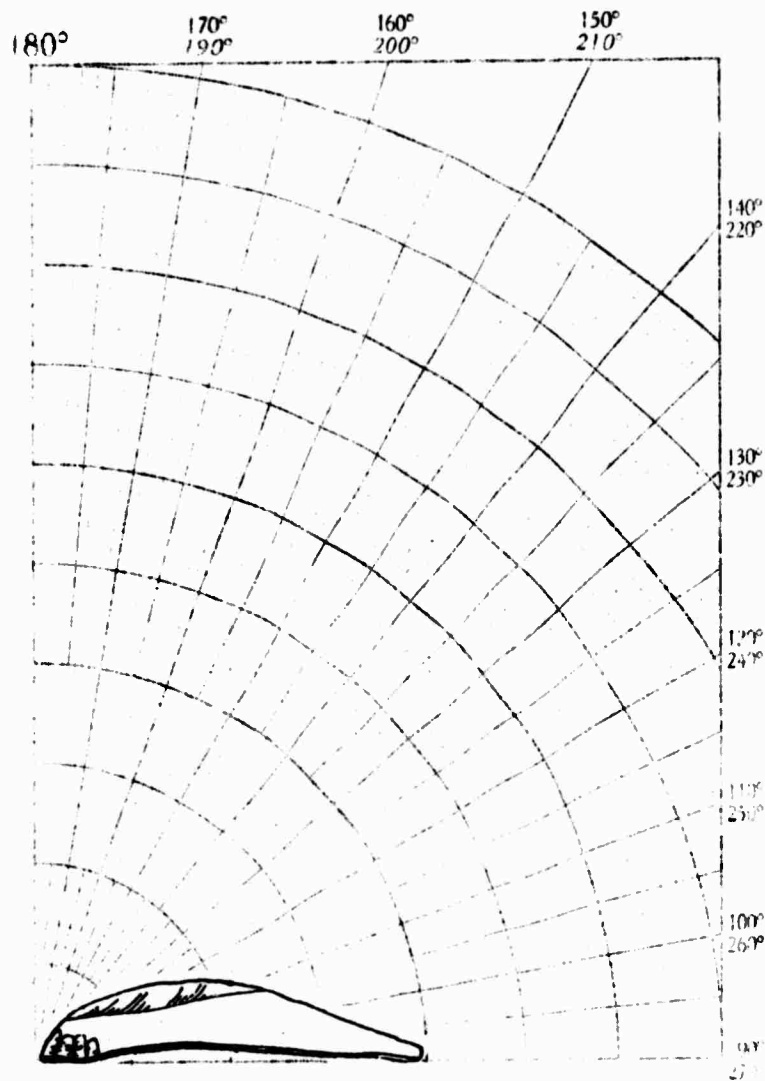


Figure 4. Scraper angle as measured on polar graph paper.

Wilmsen, investigating tools from Paleo-Indian sites, discovered that the most common edge angle was between 46 and 55°. These angles occurred on both lateral and distal ends. His proposed scraper uses included "(1) skinning and hide scraping, (2) sinew and plant fiber shredding, (3) heavy cutting of wood, bone, or horn, and (4) tool back blunting" (Wilmsen 1970: 70). He argued that scrapers with acute edge angles (26-35°) were probably used for cutting. Semenov suggests that scrapers ranging from 35-40° were used as whittling knives (Semenov 1976: 20). Wilmsen suggests that tools with more acute edge angles may have been used for meat and skin cutting. These angles all occur along lateral edges. Recently, Briuer (1976) has argued for the need to study residues on scraper edges. By studying these residues it is possible in some cases to determine whether the tool was used to work with plants or animals.

Proximal end scraper. These are flakes on which the proximal platform has been reworked to form a beveled scraping edge. Often times one or both sides have step fractured flakes revealing their multiple use as side scrapers.

Analysis: measurement of maximum length, width, and thickness, and weight. Edge angle was measured on polar graph paper in the same manner as described for distal end scrapers. In some instances the bulb of percussion was completely reworked. In these cases it was possible to study the concentric fracture ring pattern and determine which was the proximal end. This procedure was also used when either end of the flake was absent. The type and quality of lithic material, and the presence or absence of cortex was recorded.

Side scrapers. The lateral margin of these flakes has been retouched to form a beveled scraping edge.

Analysis: measurement of maximum length, width, and thickness; and weight. Edge angle was measured on polar graph paper. Notation was made of the type and quality of lithic material, the side worked and the presence or absence of cortex.

Scraper fragment. These are portions of tools having beveled scraping edges, but are too small to determine the type of scraper.

Analysis: measurement of maximum length, width, and thickness; and weight when feasible. Edge angle was measured on polar graph paper. Type and quality of lithic material and the presence or absence of cortex were noted.

Lateral edge flake scraper/knife. These are flakes that have been retouched, in a regular pattern, along one or both lateral edges.

Analysis: measurement of maximum length, width, and thickness; weight. Flakes were placed on polar graph paper to measure the lateral edge angle of the dorsal surface (LEADS) and the actual working edge (Fig. 5). This was done to see if the LEADS correlated with the working edge angle in a predictable manner. Type and quality of lithic material was noted, platform preparation, presence or absence of cortex, and lateral margin worked (left or right).

Modified blade/knife. These are flakes that are at least twice as long as they are wide, having retouched or worn lateral margins; probably used for cutting.

Analysis: measurement of maximum length, width, thickness; and weight. Both LEADS and working edge angle were measured on polar graph paper. The type and

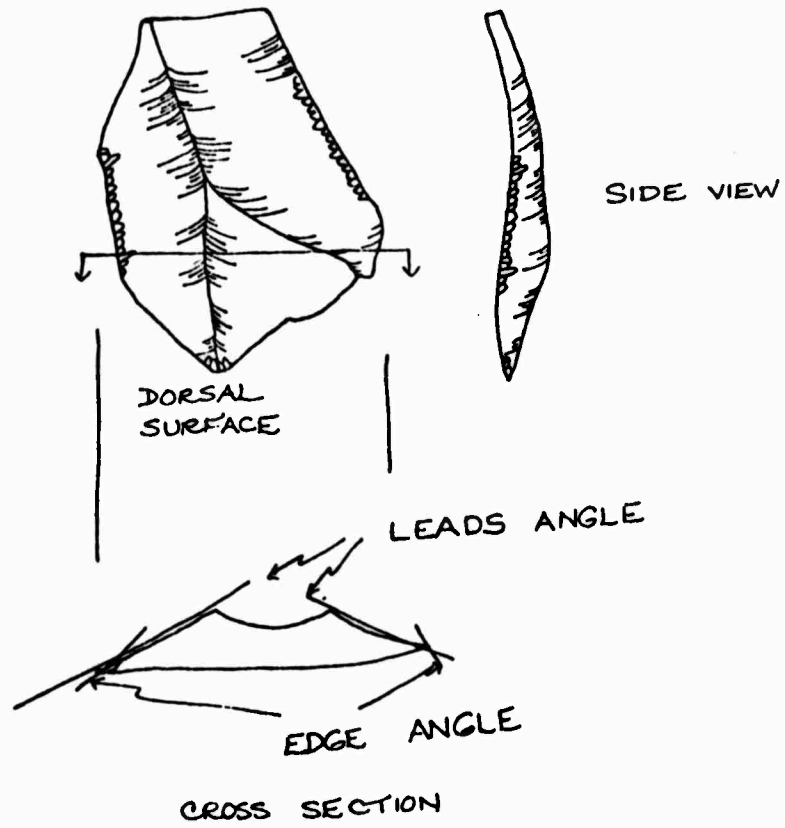


Figure 5. Terminology used for lateral edge flake scraper/knives.

quality of lithic material were noted, platform preparation, presence or absence of cortex, and the side worked.

Bifaces. These are flakes that have been retouched on both sides. In most cases cortex and primary flaking has been obliterated by secondary, smooth, lamellar and expanding flake scars (Binford 1963: 205). Usually oval or triangular in outline, they have elongated oval cross sections; used for a variety of functions.

Analysis: measurement of maximum length, width, thickness; and weight. Notation of type and quality of lithic material, and presence or absence of cortex.

Biface fragment. These are broken bifaces.

Preform. These bifacially worked stones, usually thicker than a biface, have few or no final retouch flakes removed from the margins. These could have been worked into bifaces or projectile points at a later date.

Analysis: measurement of maximum length, width, thickness; and weight. Notation of type and quality of lithic material, and presence or absence of cortex.

Large projectile points. These are laterally symmetrical bifaces more than 35 mm long, more than 30 mm wide, and over 5 mm thick. In some cases cortex is still visible, although in most instances primary flaking has been obscured by secondary chipping. Secondary chip scars are usually smooth lamellar and expanding scars. The majority of these points are corner notched. Since there is no definitive statement on Missouri Ozark projectile points, the procedure used by Roper and Piontkowski (1977) has been followed here. Several sources (Bell 1958, Bray 1956, 1957; Chapman 1965, 1975) have been used to identify the points. Many point blade edges have been smoothed,

crushed or step fractured. These types of edge damage suggest that the points were multifunctional, serving as cutting and scraping tools.

Analysis: measurement of maximum length, width, thickness; and weight. Broken points were noted by recording the portion of the point that was absent (Fig. 6). Notation of type and quality of lithic material, plotted on polar graph paper, and presence or absence of cortex.

Arrowpoint. Small projectiles usually exhibit lateral symmetry. Size varies, ranging from one to three and a half centimeters long, less than one half centimeter thick, and less than three centimeters wide. Usually fine, delicately flaked tools. In some cases cortex remains, but generally it has been removed. Primary flaking appears fine on many of the very small, thin points. Often only an edge has been retouched to form a point, thus making it difficult to distinguish between primary and secondary flaking.

Analysis. Same as above.

Knife. These large bifaces may be laterally symmetrical (but not always), and have elongated oval cross sections. They are more than 70 mm long, 25 mm wide, and 10 mm thick. They are marginally retouched; edges are finely flaked and are often smoothed from wear.

Analysis: measurement of maximum length, width, and thickness; and weight. Notation of type and quality of lithic material, plotted on polar graph paper, and presence or absence of cortex.

Drill. These bifacially worked tools have an elongated tip, almost circular or diamond-shaped in cross section. Some drills may be hafted ("reworked projectile

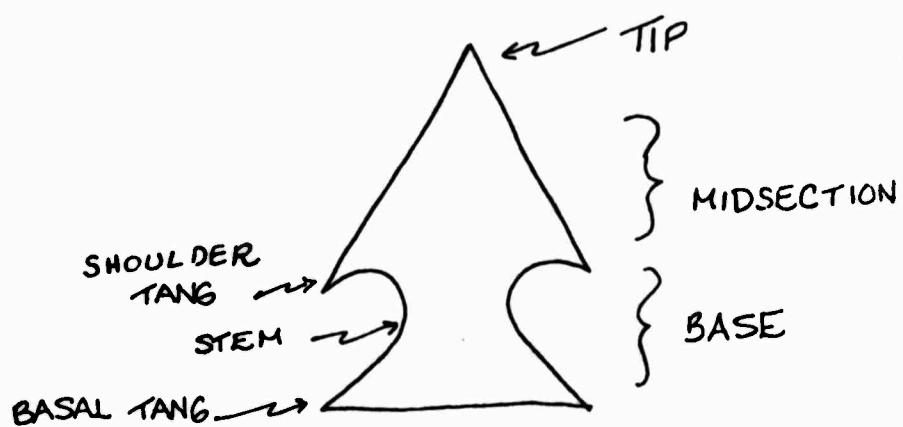


Figure 6. Terminology used for projectile points.

points"). In many instances the drills have wide, fine, thinly flaked bases that could have been hafted. Often only the broken drill tip remains.

Analysis: measurement of maximum length, width, and thickness; and weight. Notation of type and quality of material.

Graver. This group is represented by flakes exhibiting marginal retouch and a pointed, worn spur. McDonald (1968: 100) writes that the graver spur tips show "both moderate wear polish and the removal of small flakes from the ventral surface." Most of the gravers in this study appear highly polished and smooth. Although a characteristic tool in Paleo-Indian tool kits, their function is unknown. These tools may have been hafted.

Analysis: Measurements of maximum length, width, thickness, and weight were taken. Lithic type and quality and presence or absence of cortex was recorded.

Ground Stone Tools

Abrader. These sandstone tools have a long straight groove worn in at least one surface. Groove size varies from 5 to 15 mm; presumably used for smoothing arrow shafts.

Analysis: measurement of length, width, and thickness; and weight. Notation of groove size.

Nutting stone. These sandstone pieces have one or more rounded pits on one or more surfaces. These pits have traditionally been interpreted as nut processing scars.

Analysis: measurement of maximum length, width, and thickness; weight; and size and depth of pits.

Metates. These sandstone slabs have a smoothed surface or a shallow basin worn in one surface, usually oval or circular in outline; they are inferred to be the result of grinding.

Analysis: same as above.

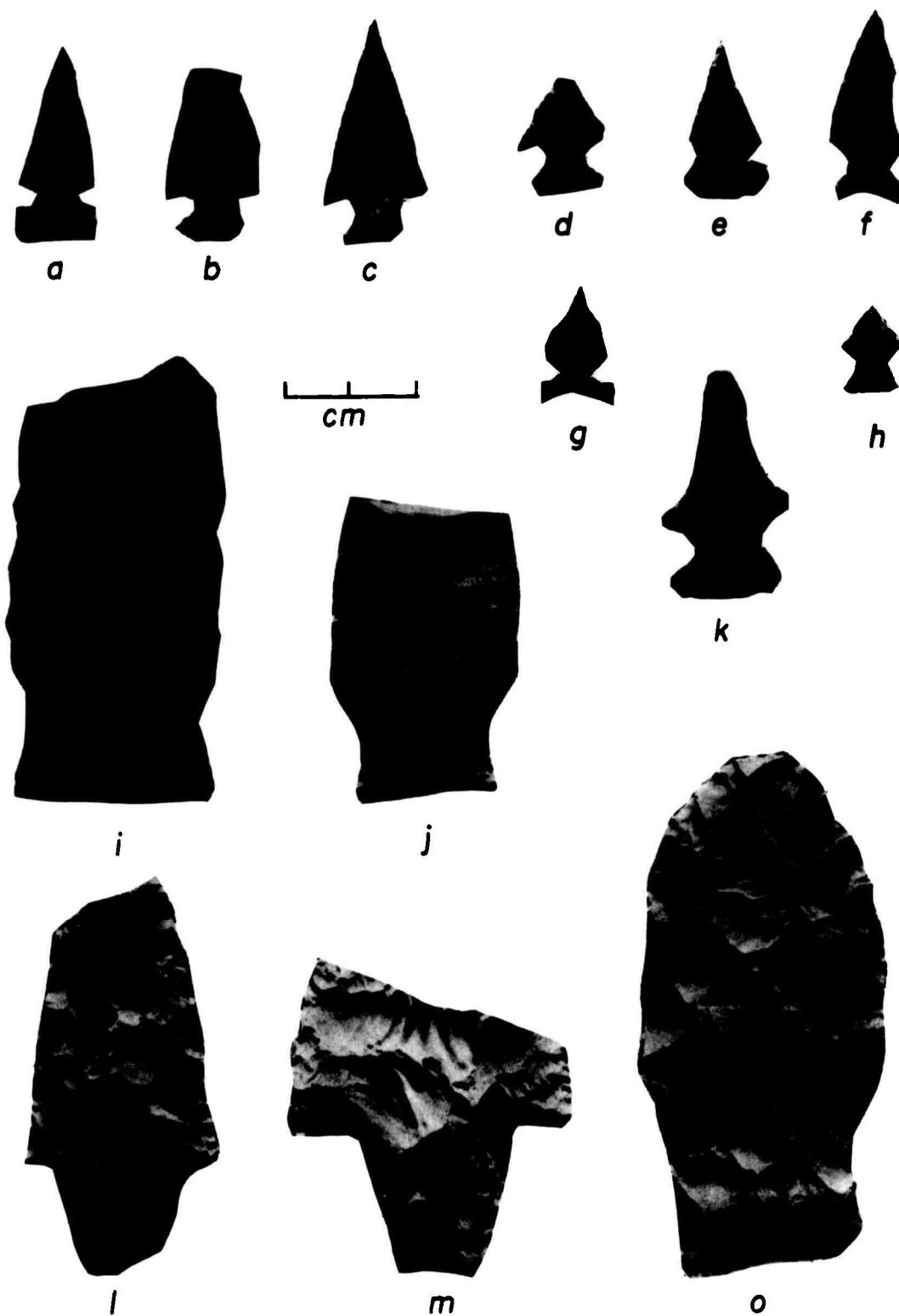


Figure 7. Chipped stone tools. (a) Cahokia point, (b-c) Scallorn points, (d-h), arrowpoints, (i-j) Rice Side-notched points, (k) drill, (l-m) Langtry points, and (o) knife.

GRAY SHELTER, 23SR122

Gray Shelter is on the left bank of an intermittent creek which empties into Salt Creek, which flows 1 km south of the site (Fig. 8). The shelter is beneath a north-south trending sandstone ledge that protrudes from a steep, forested slope. The local vegetation is largely oak and small scrub oak undergrowth with frequent patches of lichen.

Gray Shelter was recorded during the winter survey of 1959. It was tested in 1960 and 1961 (Chapman 1965: 449-480). Chapman estimated the shelter to be 525 feet long and 25 feet wide at the maximum point. His test excavations were made in the southern, widest portion of the overhang. About 210 square feet (surface area) was excavated to a depth of three feet, in arbitrary six inch levels. One 5 x 5 foot pit was dug in the northern part of the shelter. The shelter had been used for livestock, camping and picnicking, and Chapman (1965: 450) writes that whereas

there was no evidence that the shelter had been dug into by relic collectors, it was found that it had been disturbed a great deal by burrowing animals and by the Indians themselves digging pits or removing deposits to level the floor.

Unfortunately, we were unable to differentiate where the preliminary excavations in 1960 (Chapman 1965: 457) were dug in relation to the 1961 excavations.

Chapman summarizes the artifacts recovered from the preliminary excavations. These include Cahokia Notched, triangular, Langtry, and a variety of unidentified projectile points; drills, cores, snubbed flake scrapers

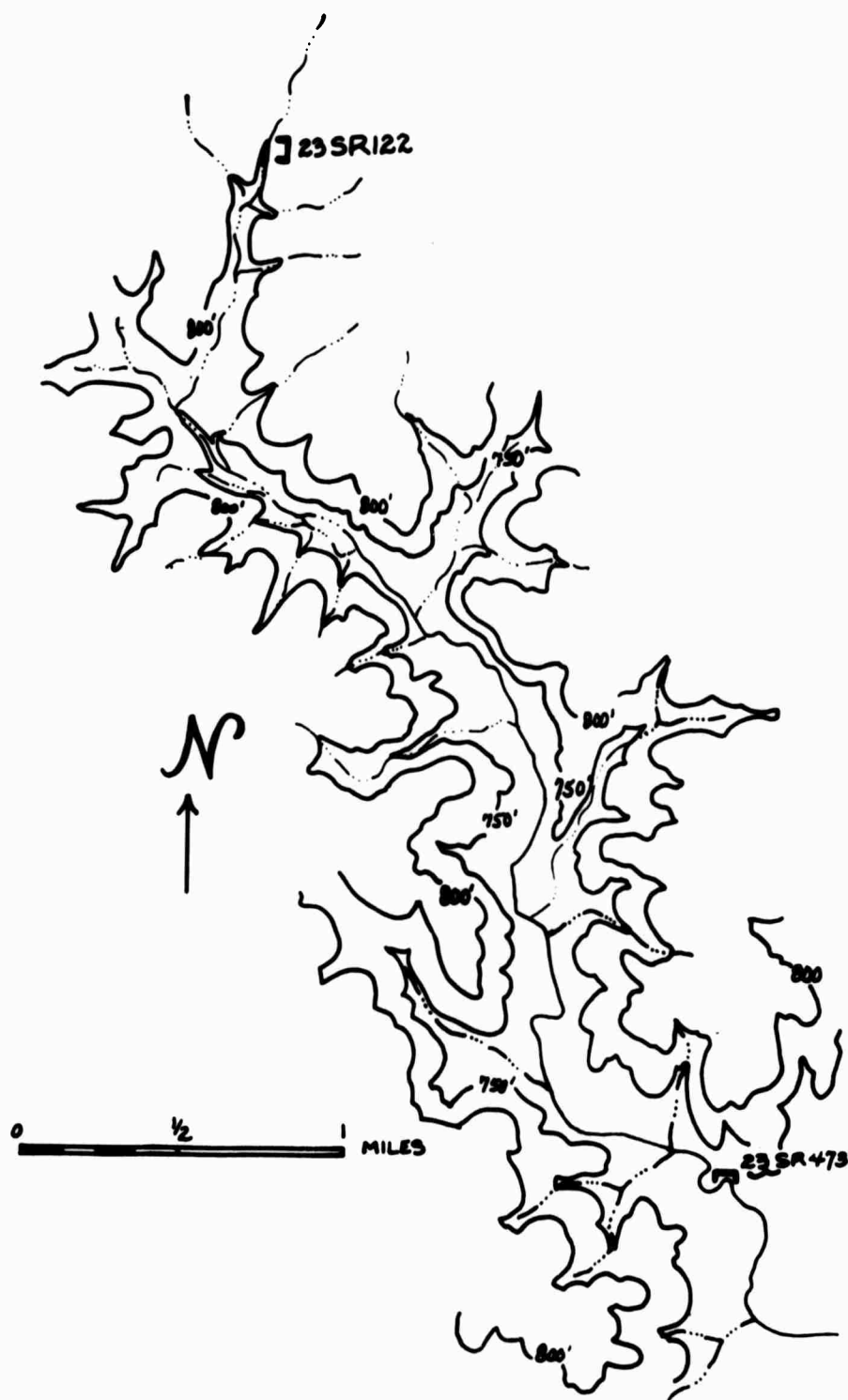


Figure 8. Topographic setting of Gray Shelter (23SR122) and Magnolia Spring Shelter (23SR473).

(this term is not defined), pitted anvil stones, and both shell-tempered and clay- or grit-tempered pottery.

Only two features, a "concentration of burned rocks seeming to represent a fireplace," and an adult human burial were unearthed. Chapman (1965: 450) also reported a sandstone mortar and a "large pitted anvil stone."

Chapman reports the 1961 excavations by six inch level and artifact class. Four artifact classes are distinguished: projectile points, chipped stone artifacts, pecked and ground stone; and pottery sherds. Level 1 (0-6 inches) is discussed separately. Projectile points were mainly triangular and Scallorn-like, with two Cahokia Notched. Chipped stone tools included snubbed flakes, snubbed blade scrapers (1965: 464), a reworked point scraper, an expanding based drill, flakes used as knives, and one blade knife.

Chapman discusses the projectile points by level, but since no cultural units could be distinguished we shall summarize all levels. Levels 2-6 contained Scallorn, Cahokia Notched, Snyder's Notched, Langtry, Rice Contracting Stemmed, Rice Side Notched, triangular corner notched, and one straight-stemmed projectile point.

In the original report all chipped stone artifacts from Levels 2-5 are discussed in three paragraphs. These tools included a small snubbed flake scraper, large spall scrapers, bifacially flaked ovoid blades, flakes used as knives, cores, and "rejectage" (1965: 464)

Ceramics from Levels 2 through 6 are presented in a condensed summary (1965: 477, 479) and are further described by Carlson (Vol. V, Pt. III). Chapman distinguishes three ceramic types: clay- or grog-tempered, shell-tempered, and grit-tempered. Clay- or grog-

tempered sherds were generally plain, with a roughly smoothed or cord marked exterior, and were 6 to 12 mm thick. Two sherds were decorated: one was incised, and one rim sherd had punctations on the lip. Clay- or grog-tempered pottery occurred throughout the 3 feet of fill.

Shell-tempered pottery was plain, or had parallel-trailed lined ranging from 5 to 7 mm wide. Few of these sherds were recovered.

Grit-tempered sherds were cordmarked and plain, and were 6 to 8 mm thick. Chapman notes:

It is suspected that some of the clay or grog tempered pottery might have been classified in some instances as grit tempered or vice versa.

Chapman (1965: 480) explained that Gray Shelter had a "confusing ... sequence of cultural assemblages." He suggested that two possible Archaic period groups occupied the shelter, based on Afton and Rice Contracting Stemmed points, and went on to say "any further interpretation at this time is not feasible." Chapman concluded that "other parts of the shelter might be less disturbed and might have deeper and more definitive deposits."

The 1976 test excavation was dug in the north half of the shelter (Fig. 9). Test pit A was about 6 meters north of the 1961 trench (which is not shown on the map). The north half of the shelter averages three meters wide, compared to the 25 foot overhang in the south part of the shelter where Chapman excavated. The transit was set up just north of the 1961 trench and used to map the shelter and place the four one meter squares: Test Pits A, B, C, and D. Two grids were drawn on the map, one in the shelter and the other on the slope. Two pits selected from each grid were chosen by random number. This was a stratified random sample, because

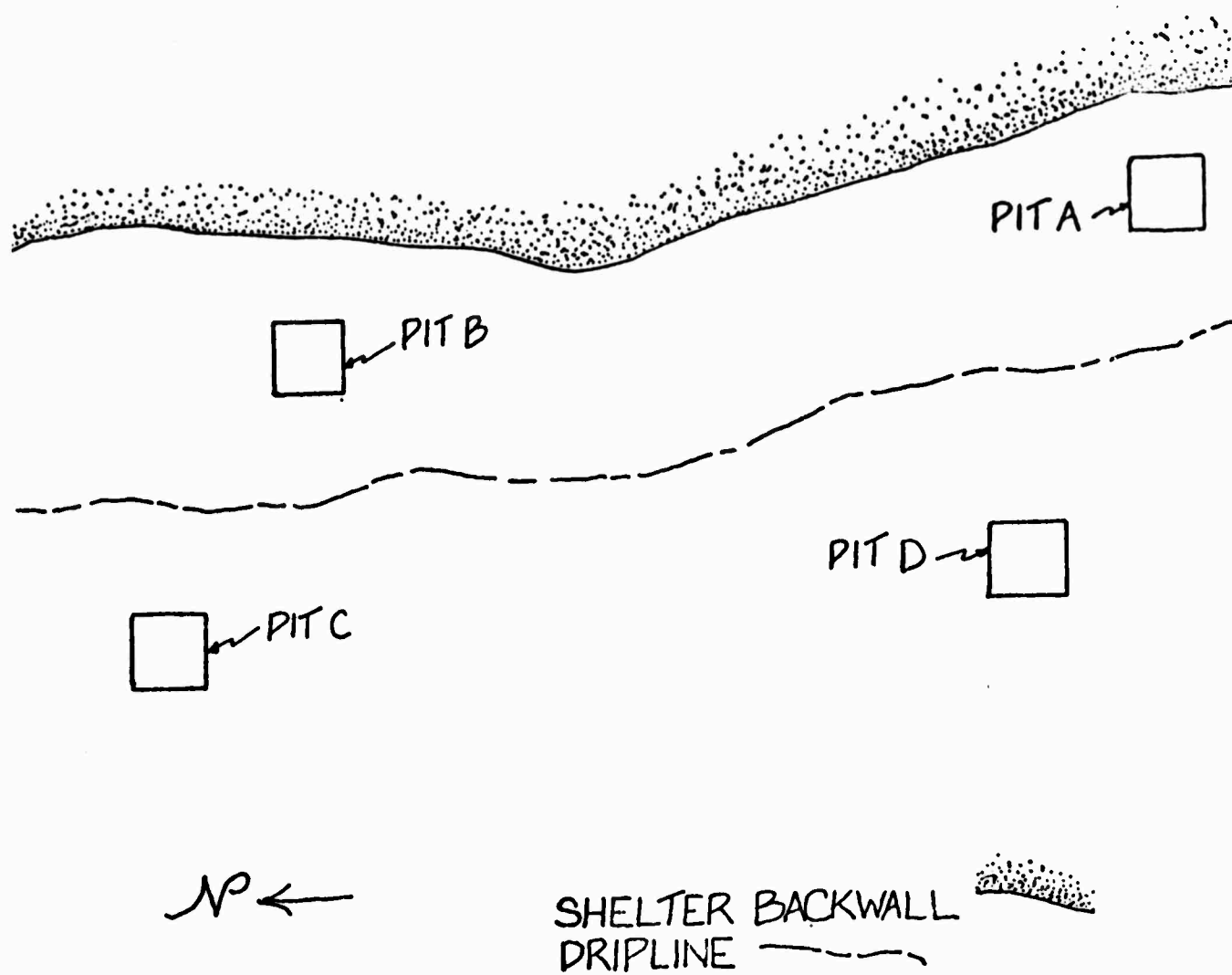


Figure 9. Map of Gray Shelter, 23SR122. Scale: test pits are one meter square.

TABLE 1

Gray Shelter (23SR122) Artifacts

Class	Levels																				Totals																
	Surface				0-10cm				10-20cm				20-30cm				30-40cm					40-50cm				50-60cm				60-70cm				70-80cm			
	A	B	C	D	A	B	C	D	A	B	C	D	A	B	C	D	A	B	C	D		A	B	C	D	A	B	C	D	A	B	C	D				
Projectile points	1				1				1				1																			4					
Point tips	1				1				1																							3					
Point midsections		1							1								1															3					
Point bases		2	1			3			1				1								1											9					
Cores			1																													2					
Lateral edge flake																	1																				
scraper/knives		1				4							1																			8					
Distal end scrapers		1												3																		4					
Proximal end scrapers	1																																				
Scraper fragments		1				3			1				1	1											1							4					
Utilized flake		1	1			8			1				1	1										1	1							12					
Modified blade/knife		1																														16					
Biface	1	4	1			1	2		1				1	1							1			1								1					
Projectile point/knife		1																						1								2					
Battered		1	1																													5					
Nutting stones									1	1													1									2					
Drills	1																															5					
Prehistoric ceramics	1	3				3											1	1	1													2					
Metal			1	3																										1		4					
Hematite																																					
Bone	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x					x											x					
Vegetal		x	x	x	x	x	x	x	x	x	x	x	x	x	x	x					x											x					

no trees or fall rock obstructed the first four randomly selected pits. Pits A and B were staked out inside the shelter and excavation began. Pits C and D, on the slope in front of the shelter, had to be cleared of small brush.

Twenty-one artifact classes were recovered from the excavations and are reported, by pit level and class (Table 1). Most of the artifacts were in Pit A. Since Pit A was closest to the wide part of the shelter, it seems likely that this part of the overhang saw more use than the narrower, northern section.

Most of the projectile points were small, thin, and side notched, of the type Chapman (1965: 457) called Cahokia Notched. Several corner-notched Scallorn points were recovered. Less than half of one large corner notched point was in Pit A.

Three large, asymmetrical bifaces with worn lateral margins were classified as point/knives. One was in Pit B at a depth of 29 cm, and two were in Pit A at 3 and 69 cm. The differences in stratigraphic position make any definitive statement about cultural affiliations difficult. Traditionally, large/projectile point knives, such as these, are classified as Archaic, but their context here suggests they may be Woodland in origin.

Most of the scrapers were in Pit A. Distal end scraper angles ranged from 42 to 70°. Proximal end scrapers had high beveled angles ranging from 43 to 63°. Wilmsen (1970: 70) argued that acute angles (26-35°) were used for cutting, while higher angles (46-55°) were used for a variety of tasks including scraping and wood working. Bruier's (1976) analysis of the residue on

scraper edges has revealed woody plant material. Since animal tissue is relatively unstable it is impossible to rule out the possibility they may have been used to scrape hides. Eight lateral edge flake scraper/knives were recovered from Pit A. Although the edge angles are rather high (42-70⁰), the flakes are so thin and the LEADS are so low it seems likely that these were used for cutting.

Three nutting stones and one metate were excavated; one of each was in Pit A. Two nutting stones were in Pit B.

Since only two features were observed in the previous test excavations, it is not surprising that the 1976 tests revealed no features.

A variety of small bone fragments were found, nearly half of them charred. This poses an interesting question because only one possible hearth was discovered in the 1961 excavation. Pit B (1976 test) had a concentration of sandstone rocks, but since no charcoal or reddened sandstone was found, it seems unlikely that this was a hearth. Hearths may have been destroyed, or the peoples using the shelter built their fires on the ground and resulting ash layers or burned soils have been scattered.

Animal species present at Gray Shelter include Terrapene sp. (Box turtle), T. ornata (Ornate box turtle), Testudines spp. (Turtle), Sylvilagus floridana (Eastern cottontail), Geomys bursarius (Plains pocket gopher), Urocyon cinereoargenteus (Gray fox), and Odocoileus virginianus (White-tailed deer) (Robert Warren, personal communication). Several bone fragments from each species are present, but they represent only one individual per species.

The complete tool assemblage - projectile points, scrapers, drill, nutting stones, manos, ceramics, etc. - lead us to suggest that Gray Shelter was a habitation (or base camp) site, occupied for indefinite periods.

Fitzhugh (1972: 137) has defined a base camp as

Several families occupying a site for an extended period. Utilized as the central focus of activities in a resource area during a portion of the season. Identified as similar to Type I (Gathering Site), but smaller, with less evidence of religious and social activity.

He continues by describing exploitation camps, which are occupied by a family or an extended family for several weeks of hunting, fishing or gathering. These sites have simple dwellings with artifacts representing a variety of activities and quantities of domestic debris.

Roper, in her discussion of settlement pattern along the Sac River, just south of the study area, explains that sites yielding

points of the Langtry, Gary, and Rice Side Notched types ... stand out as possibly base camps or "villages." This assessment is made on the basis of the presence ... of a large number and variety of cutting, scraping, processing, and manufacturing tasks (Roper 1977: 90-91).

Brose and Essenpreis (1973: 69-70) have defined four types of archeological sites found during survey of Monroe County, Michigan. They defined a village site as:

Some indication of population aggregation seen in the area of the site being greater than 5,000 square feet. Some evidence for both male and female activity; fabricating or general

tools, areal variation in distribution of material. Midden refuse areas, numerous pits or post-mold patterns right be present. Hearth areas should exist. Ceramics in post-Archaic periods.

Ozark habitation sites, while exhibiting some of these characteristics, would be smaller in size. They also describe "small family camps" exhibiting few storage pits, possible hearth areas, ceramics in post-Archaic periods, and tool kits relating to both male and female tasks. These range in size from 1000 to 5000 square feet. We stress here the importance of female and male tasks. Brose and Essenpreis define female activity sites (1973: 70) as having,

knives, steep retouch scrapers, heavy scrapers, drills and/or perforators, manos, pestles, naiad shell often present, ceramics in post-Archaic sites. Small area of artifact distribution with little areal variation.

Artifacts conducive of male activities, in particular hunting activities, include projectile points, especially broken points, scrapers, knives, choppers, animal and bird bone, and debitage.

From the previous discussion, it is obvious that tools representing both male and female activities are present at Gray Shelter. Therefore, the shelter is classified as a base camp.

However, we stress an important point discussed by Jelenik (1976); that is, interpretative error as the result of inadequate stratigraphic control. Chapman (1965: 450) complained of mixing at the site. As noted above, the 1976 tests revealed no clear-cut stratigraphic sequence.

Intrasite Analysis

The debitage graphs (Fig. 10) for Gray Shelter peak near 20 centimeters depth inside the shelter and near 30 centimeters on the slope. These peaks could be explained in a variety of ways. For example, they may represent the most intensive of several shelter occupations. Possibly this may represent only one occupation with shifting of artifacts due to natural agents.

The actual percents of debitage classes (Table 2) are interesting in themselves. The total debitage inside the shelter is double that found on the slope. However, this is not the most important aspect of the debitage analysis. The similarity in percentages of each flake class is striking. We suggest that similar activities were conducted both inside and outside the shelter, or that flakes were swept out of the shelter, accounting for similar percentages in debitage classes in both areas.

The fact that most debitage is miscellaneous shatter is rather unexpected. When the research design was drawn up, it was anticipated that the tools were made from local chert cobbles that could be obtained from nearby creeks. However, the low number of primary and secondary flakes leads us to believe that Gray Shelter tools were manufactured from tabular chert deposits, preforms that were carried onto the site, and cobbles that had cortex trimmed at the collection site.

The lithic artifacts within the shelter dripline outnumber these deposited on the slope by a ratio of

GRAY SHELTER

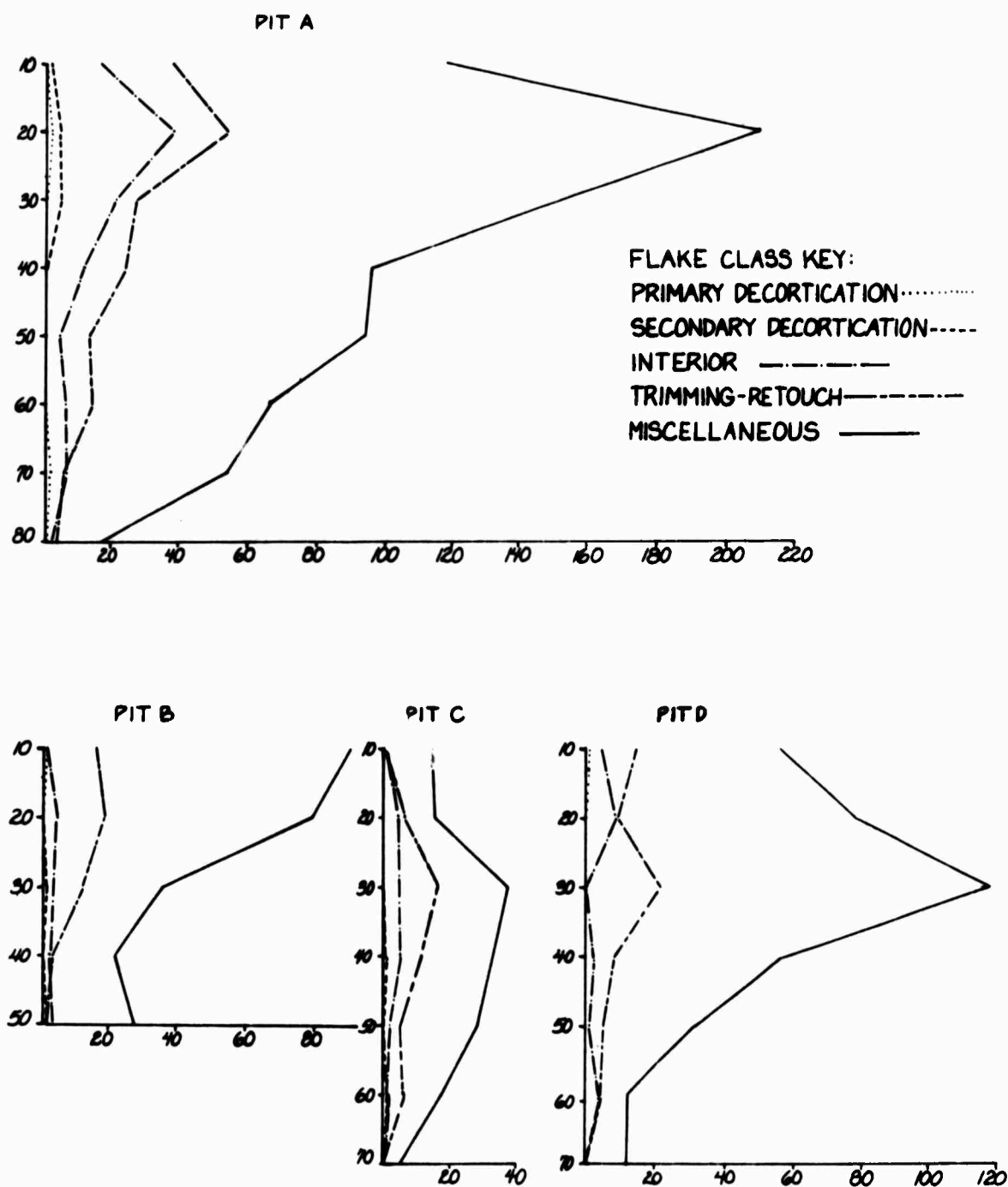


Figure 10. Debitage graphs, Gray Shelter. Presented by arbitrary 10 cm levels for Pits A, B, C and D.

TABLE 2

Gray Shelter (23SR122) Debitage Percentages

Inside shelter			
	Totaldebitage counts	Percents	Total number of whole flakes
Primary decortication	4	.3	4
Secondary decortication	11	.8	11
Interior flakes	119	8.6	119
Trimming-retouch flakes	187	13.5	187
Miscellaneous	1077	77.5	
Total	1398	~100.	321
			~100.
Outside shelter			
	Totaldebitage counts	Percents	Total number of whole flakes
Primary decortication	1	.2	1
Secondary decortication	1	.2	1
Interior flakes	32	5.2	32
Trimming-retouch flakes	95	15.4	95
Miscellaneous	489	79.1	
Total	618	~100.	129
			~100.

5:1. Broken artifacts including projectile point tips, midsections, and bases; broken drills, scraper fragments, and pottery have an inside/outside the shelter ratio of 2.5:1. The majority of artifacts were recovered in the top 30 centimeters of the shelter deposit.

White and Peterson (1969), in their analysis of five rock shelter sites in northern Australia, studied ratios of waste flakes to bifacially worked tools. Three shelters along the coast were excavated. The lower levels of deposition correlated chronologically with a glacial period when sea level was low, so that these were inland sites. A variety of artifacts, including scrapers, utilized flakes, axes, hammerstones, and hematite were recovered. They argue (1969: 61) that

the secondarily retouched implements seem to have been manufactured on the spot, as is evident from analysis of the raw material and size of waste flakes and implements, and by an overall ratio of tools to waste flakes of 1:33.

As the glaciers melted, sea level rose, and the shelters became coastal sites. The cultural deposits from these periods include uniface and bifacial points, scrapers, utilized flakes, and axes. The low tool to waste flake ratio of 1:5 leads White and Peterson (1969:53) to believe that "Most of these tools seem to have been manufactured elsewhere."

Newcomer (1971) conducted quantitative experiments in handaxe manufacture. He collected flint cobbles and flaked them, using various hard and soft hammer techniques, to similarly sized and shaped bifaces. Newcomer quantified

three stages of manufacture: roughing-out, thinning and shaping; and finishing. He measured and counted all of the waste flakes so that he could reconstruct the manufacturing process. Approximately 50 flakes were struck off during manufacture. The first 10 to 20 were generally involved in the first stage of manufacture. The next thirty to forty flakes were taken off by trimming, thinning, and finishing.

For the purpose of this study both articles are interesting. The first ratios by White and Peterson (1969) appear to be intuitive, based on lithic analysis, while the ratios of Newcomer (1971) are based on replicative or experimental archeology. The artifacts from Gray Shelter, along with the other five shelters reported herein, are thin tools made on flakes. These appear to be made on flakes rather than from total cobble reduction. We feel that Newcomer's ratio of one biface to 50 waste flakes, 1:50, is high for these small, Ozark rock shelters. For example, many of the small Scallorn and Cahokia points exhibit only minor bifacial retouching. It seems unlikely that 50 waste flakes would be discarded after manufacturing many of them. At these sites a ratio of 1:30 seems more realistic, because the tools would primarily involve the trimming and thinning processes. This ratio is close to those, 1:25 and 1:33, noted by White and Peterson (1969: 61, 51).

Gould et al. (1971: 157) reports that "No instances of bifacial retouch were observed" among the Aboriginies. Extensive surface collections revealed only two bifaces. Flakes found on these sites are all used for the manufacture of uniface tools.

TABLE 3

Ratios of Bifacially Worked Tools to Waste Flakes
Gray Shelter, 23SR122

<u>Levels in Centimeters</u>	<u>Inside Shelter</u>	<u>Outside Shelter</u>
10	1:22.23*	1:91
20	1:60	1:59.5
30	1:86	1:99.5
40	1:54.33	1:37.3**
50	1:37**	1:74
60	1:89	1:43**
70	1:35**	0:19
80	0:22	
Averages	1:42.5*	1:64.7

* Below limit set by White and Peterson (1969)

** Below limit set by Newcomer (1971)

Table 3 presents the ratios of waste flakes to bifacially worked tools by ten centimeters excavated at Gray Shelter. Generally the ratios are high, ranging from 1:22.23 to 1:99.5. Those marked with an asterisk are low according to the ratios developed by Newcomer (1971) and White and Peterson (1969). If we look at the data in light of our change of Newcomer's ratio of 1:50, that is 1:30, only the top ten centimeter, interior level would be low. Overall, it appears that the high biface tool to waste flake ratios are indicative of on-site chipped stone tool manufacture.

Ethnoarcheological studies are helpful in trying to solve the problem of habitation site definition. In his study of the !Kung Bushmen, Yellen (1977: 96) explains:

Because of the relatively greater amount of time people spend around the family hearth, more likely than not the fragments will be found in that context...

He is quick to note that because two items are found close together they are not necessarily related. He cites the coincidence of hammerstones and anvils used for nut processing and broken bone. Although found together at the habitation site, the tools do not reflect the same activities. Concluding, he explains:

Most tasks may be carried out in more than one place in more than one social context; and conversely, in any one single area, one can find the remains of many activities all jumbled together.

Clearly, Yellen holds a pessimistic view of activity area studies in archeology.

Clark (1977), however, reported that in a Kenya village, men would spread a hide on the ground and chip all of their stone tools over it, so that all waste flakes fell on the hide. The hide was then carried to the village dump and the waste flakes were dumped on top of the refuse pile. In this way no debris was left in the habitation area. This concept is important because there was no danger of the villagers cutting their feet on chipping debris.

It is possible that this same type of refuse behavior was conducted at the small Ozark rock shelters reported here. The observations of Clark (1977) corroborate the reports of Nance (1975: 128-129). Nance watched the Tasaday sweep their shelters clean. The debris was swept out onto the slopes below the shelter. Refuse that was moved from the area of use is classified by Schiffer (1976) as secondary refuse. This sweeping, piling, or carrying away to the dump is a form of behavior which would account for the low frequencies of flakes and waste tools found inside the shelters. The debitage samples from the pits dug at Gray Shelter exhibit more debitage inside the shelter. It is possible that part of the shelter was used as a dump area. However, if the shelter inhabitants wore woven sandals the presence of waste flakes and tools would be less hazardous. Alternatively, the debris may have been left as the inhabitants did not plan to return. Support for this interpretation is found in Yellen's (1977: 67) observations:

Old sites tend to attract fleas, ticks, and other forms of insect life which makes it more pleasant

to relocate...if a group returns to an old site in the same season, gathering will be slightly more difficult because the closest and most easily collected resources will be gone.

Although the refuse behavior is puzzling, the high ratios of waste flakes to bifacially worked tools and the total tool assemblage lend support to the contention that Gray Shelter was a habitation site.

MAGNOLIA SPRING SHELTER, 23SR473

Magnolia Spring Shelter, located just southeast of Magnolia Spring, was named for this natural feature, which was a resort area prior to World War II. The shelter is at the base of a sandstone bluff seven meters north of Salt Creek, a perennial stream that flows into the Osage River 1.3 kilometers to the southeast (Fig. 8). The shelter opens to the southwest 1.5 meters above the creek bank. Great pieces of fall rock lie along the west edge of the shelter. A high, narrow cave, five meters in diameter at the mouth, tapers back into the bluff for ten meters (Fig. 11).

An oak-hickory forest today occupies the top of the bluff, and oak trees line the grassy banks of Salt Creek. The floodplain is covered with succulent green plants.

In July, 1976 while surveying for rockshelters, Novick and Edward Fulda were taken to the site by a local resident. Although a flashlight was found inside the cave, the slope in front of the shelter appeared to be undisturbed and was littered with flake debitage. Consequently, testing was begun.

A transit was set up at the east end of the shelter, and two grids were drawn on the field map, one beneath the shelter overhang and one on the slope in front of the overhang. The one-meter squares were selected by random number from each grid. Pits A and B were staked out beneath the overhang, with Pits C and D on the slope. All artifacts recovered from Magnolia Spring Shelter are reported by artifact class and pit level in Table 4.

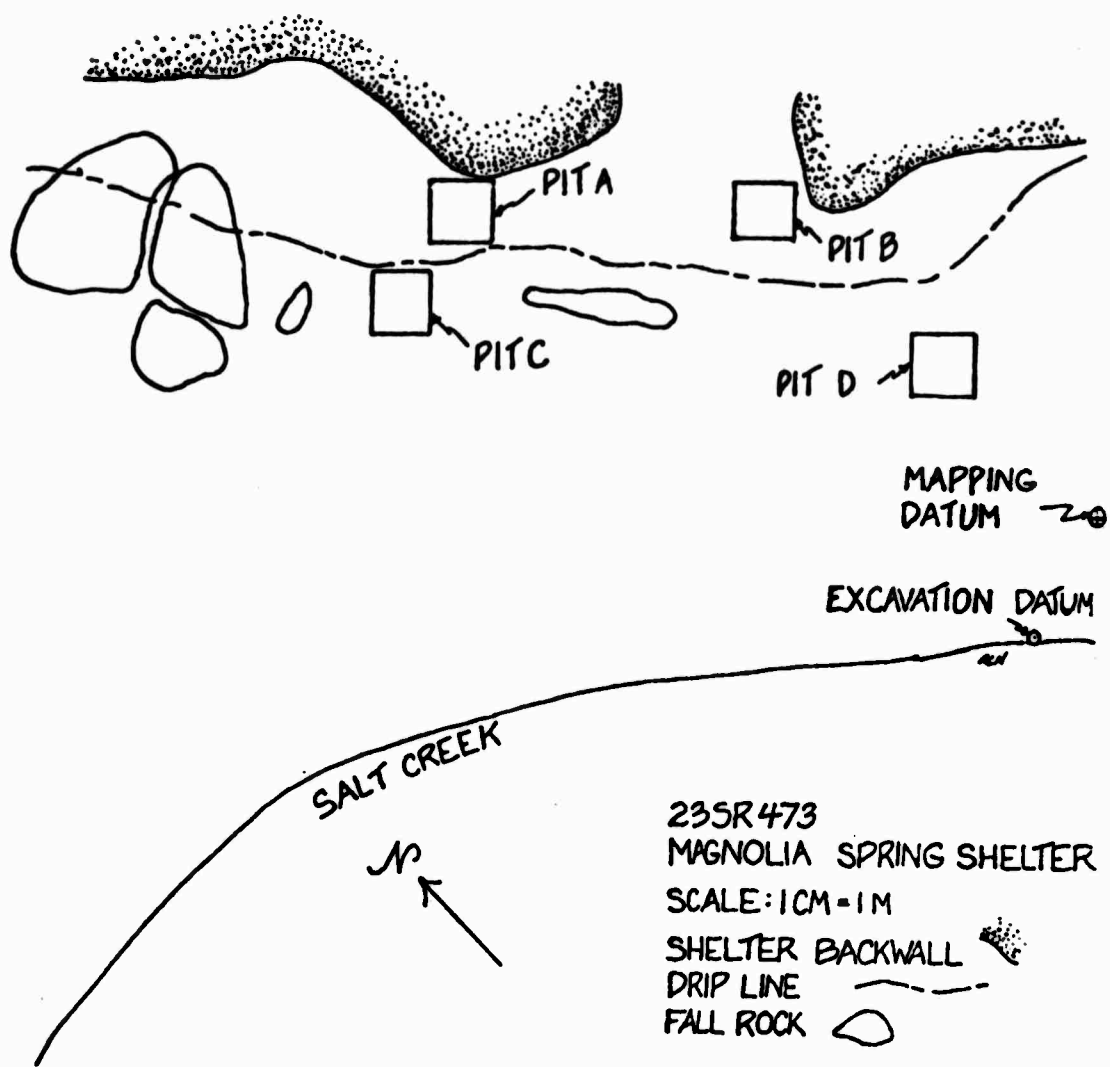


Figure 11. Map of Magnolia Spring Shelter, 23SR473.

Pit A, at the east end of the site beneath the overhang, was the least productive: it yielded only 36 artifacts. The first 10 centimeter level revealed the mid-section of a large point which, from its configuration, may have been basal-notched. Unfortunately, the fragmentary nature of the point precludes any classification. Other levels revealed a small triangular point and the tips of several small points. Three distal end scrapers with low angles of 23-40° were also recovered. Other artifacts included bifaces, biface fragments, utilized flakes, a core, a preform, one sherd, and a modern nail.

Pit B, at the mouth of the cave, was not particularly productive. This area was probably disturbed by recent digging in the shelter, for it contained an abundance of modern artifacts including glass, coins, matches, rubber bands, plastic, aluminum foil, bullet cases, and a pocket knife. Prehistoric artifacts included one (70°) distal end scraper, biface fragments, lateral edge flake scraper/knives, utilized flakes, a sherd, and one small point tip. Pit B was closed at a depth of 30 centimeters when crumbly sandstone bedrock was encountered.

Pit C was excavated outside the overhang. Although the first 10 centimeter level had recent litter similar to Pits A and B, it also contained a variety of chipped stone artifacts and prehistoric sherds. The second level (10-20 cm) also appeared disturbed. Five distal end scrapers with edge angles ranging from 22 to 55° were recovered. A variety of projectile points were found in the first and second levels. These included two parallel-sided specimens with straight bases; two small corner-notched Scallorns, the base of a side-notched Cahokia Point, and several broken tips. Other artifacts included biface fragments, utilized flakes, cores, and 19 sherds.

In the 20 to 30 cm level charcoal flecks appeared. Prehistoric artifacts included several unidentifiable projectile point fragments, five biface fragments, utilized flakes, one small antler tine, six sherds, and two nutting stones.

Artifact density in Pit C dropped in the next two levels. Projectile points included two small, corner-notched Scallorns; one small, side-notched Cahokia with a tiny, central, basal notch; the base and midsection of a Rice Side Notched; and one parallel-sided base having a slight U-shaped basal concavity. This last projectile point base, which is not heat treated, is similar to Archaic points. However, its occurrence with the Woodland period Scallorn and Cahokia Notched arrowheads suggests tool kit variability.

The next two levels (60 to 70 cm and 70 to 80 cm) contained very few artifacts. There was a concentration of charcoal in the north half of the square; however, no hearth stones were discovered.

Pit C was left open during the weekend and, although Magnolia Spring Shelter is on property owned by the Corps of Engineers, the site was visited and disturbed by looters. These people tripled the size of the pit but did not dig any deeper. On Monday we dug the last ten centimeter level, finding only two biface fragments in the upper portion of the level. The pit floor, of compact yellow clay, appeared undisturbed, so the pit was backfilled at 80 cm.

Pit D, though shallow, produced a variety of artifacts. The top ten centimeters contained recent litter, as well as a number of projectile point tips, a corner-notched Scallorn, and two side notched Cahokia points. Other chipped stone artifacts include cores,

biface fragments, lateral edge flake scraper/knives, two distal end scrapers having low beveled angles, and utilized flakes. Three body sherds were also excavated.

Level 2, containing only one glass fragment, appeared to be less disturbed. Two projectile point bases including one non-heat treated, straight, parallel-sided base with a slight U-shaped basal concavity similar to the base found in Pit C at 40 to 50 cm; and a small ahokia Notched point base were recovered. Other artifacts included biface fragments, lateral edge flake scraper/knives, a distal end scraper, and utilized flakes.

Level 3 (20 to 30 cm) contained two large Langtry point bases, biface fragments, lateral edge flake scraper/knives, and a piece of hematite.

Faunal material recovered from the excavations included a variety of species. Mollusks include Amblema costata (Three-ridge), Fusconaia flava (Wabash Pig-toe), Quadrula quadrula f. fragosa (Maple leaf), Cyclonaias tuberculata (Purple warty-back), Elliptio dilatata (Spike), Pleurobema cordatum (Pig-toe), Actinonaias carinata (Mucket), and Lampsilis sp (Mussel). Fish are represented by Lepisosteus sp. (Gar), Aplodinotus grunniens (Freshwater Drum), and Osteichthyes spp (Fish). Reptiles are represented by Sternotherus odoratus (Stink-pot), Terrapene cf. carolina (Three-toed Box Turtle), Terrapene cf. ornata (Ornate Box Turtle), Terrapene sp (Turtle), Chrysemys sp. (Turtle), Testudines spp. (Turtle). The only birds are Olor sp. (Swan), and Teraonidae spp. (Grouse/Prairie Chicken).

Mammals include Didelphis marsupialis (Opossum), Sylvilagus floridana (Eastern Cottontail), Sciurus sp.

(Squirrel), Geomys bursarius (Plains pocket gopher), Castor canadensis (Beaver), Canis latrans/familiaris (Coyote/Dog), Procyon lotor (Raccoon), Mephitinae app. (Skunk), Odocoileus virginianus (White-tailed deer), Bison bison (Bison), and Mammalia spp. (small mammals).

The shelter fill appeared uniform across the site. The top levels were of gray, sandy sediment; in Pits A and B it overlay the eroding bedrock. Pit C contained this same fill to a depth of 30 cm, where a yellow clay was encountered. Pit D was closed while still within the gray, sandy fill.

Intersite Analysis

Table 5 illustrates the bifacially worked tool to waste flake ratios. A number of these are low according to the ratios observed by Newcomer (1971). As noted in the discussion of Gray Shelter, this ratio seems high for these small Ozark Shelters. The minor bifacial retouch that characterizes many of these small Cahokia and Scallorn projectile points leads us to suggest a ratio of 1:30 rather than 1:50, the experimentally derived ratio of Newcomer. This modification ratio is closer to those described by White and Peterson (1969). In light of this, only two levels, or 18%, have low biface to waste flake ratios. The high ratios inside the shelter are representative of on-site manufacture. Likewise, the ratios outside the shelter are indicative of on-site manufacture. Both averages are high, suggesting similar activities were conducted both inside and outside the shelter, or that debitage was swept out

TABLE 4
Magnolia Spring Shelter (23SR473) Artifacts

[illegible]

of the shelter and broken bifaces were thrown out of the shelter onto the slope. The higher amount of debitage on the slope compared to the shelter interior, 3.5:1, supports the latter interpretation.

Intrasite Analysis

The debitage frequency graphs (Fig. 12) have one mode. This is similar to the single modes represented at Gray and Carved Rock shelters. The two squares excavated in the inside grid, Pits A and B, have modes at 20 centimeters. Pits C and D, on the shelter slope, are different. The projected mode for Pit C is at 30 centimeters. Pit D had the greatest number of flakes in the first 10 centimeter level.

A total of 3984 pieces of debitage (Table 6) were analyzed. The debitage from the shelter slope outnumbered that recovered from the interior grid by a ratio of nearly 3.5:1. Although the raw numbers are not the same, the frequencies of the five debitage classes from both grids are alike. The whole flake percentages, that is, excluding miscellaneous debitage, are also quite similar. The resemblance between the percentages of flake classes inside and outside the shelter tends to suggest that similar activities were conducted both inside and outside the shelter itself. However, the great numbers of debitage on the outside of the shelter lends support to the contention that waste material was swept out of the shelter.

Primary flakes compose less than one per cent of the total debitage assemblage. Combined, the primary and secondary flakes make up only 3.3% of the debitage

TABLE 5

Ratios of Bifacially Worked Tools to Waste Flakes
Magnolia Spring Shelter, 23SR473

<u>Levels in Centimeters</u>	<u>Inside Shelter</u>	<u>Outside Shelter</u>
10	1:25.6**	1:44**
20	1:50.75	1:63.55
30	1:37.33**	1:10.72*
40	0:11	1:42.33**
50		1:39.75**
60		1:85
70		1:42**
80		1:20*
Averages	1:37.89**	1:43**

* Below limit set by White and Peterson (1969)

** Below limit set by Newcomer (1971)

MAGNOLIA SPRING SHELTER

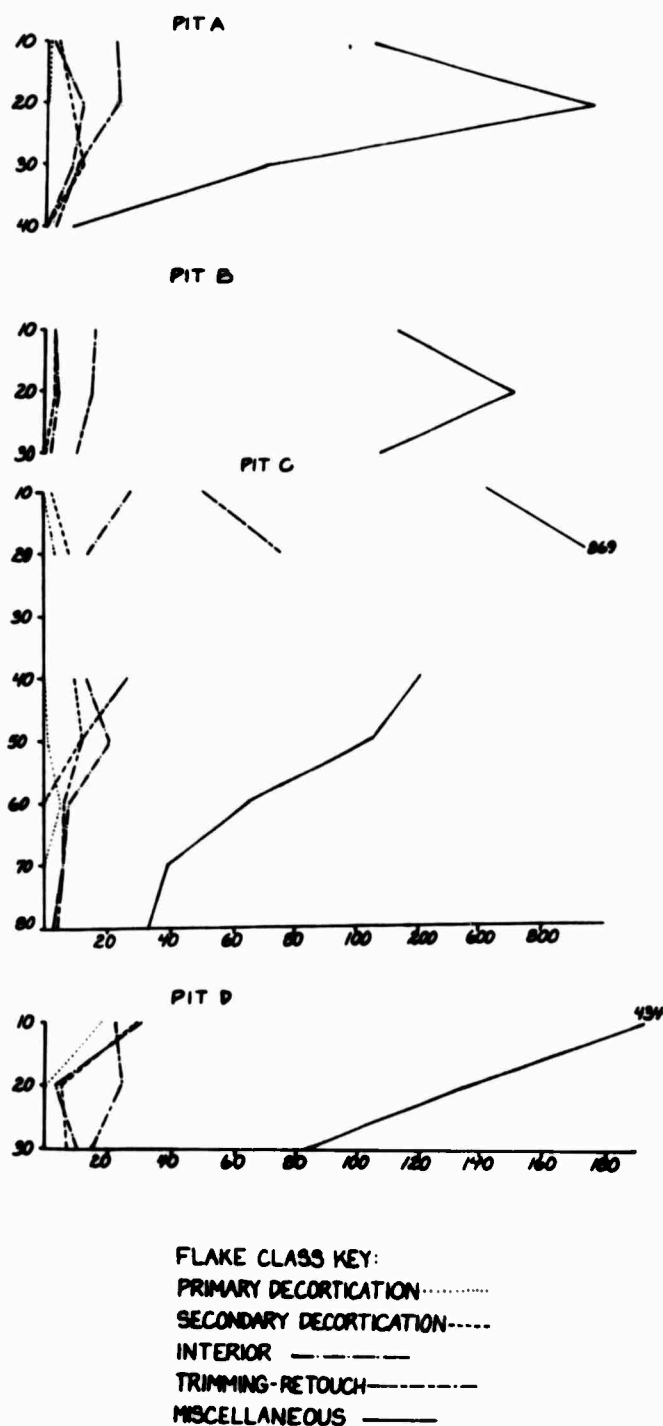


Figure 12. Debitage graph, Magnolia Spring Shelter. Presented by arbitrary 10 cm levels for pits A, B, C, and D.

TABLE 6
Magnolia Spring Debitage Percentages

Inside shelter			
	Total debitage counts	Percents	Total number of whole flakes
Primary decortication	1	.1	1
Secondary decortication	30	3.3	30
Interior flakes	30	3.3	30
Trimming-retouch flakes	99	11.0	99
Miscellaneous	736	82.1	
Total	896	100.	160
			Percents
			.6
			1.9
			1.9
			61.9
			100.
Outside shelter			
	Total debitage counts	Percents	Total number of whole flakes
Primary decortication	27	.9	27
Secondary decortication	74	2.4	74
Interior flakes	137	4.4	137
Trimming-retouch flakes	243	7.6	243
Miscellaneous	2607	84.4	
Total	3088	100.	481
			Percents
			5.6
			15.4
			28.5
			50.5
			100.

total. Few whole cobbles were brought onto the site. However, it is possible that cortex was removed or that preforms were roughed out beside the creek banks and brought back to the site. In this case few flakes having cortex would be expected at the site. This also supports the overwhelming numbers of retouch-trimming flakes.

Waste tools including projectile point tips, mid-sections, and bases, broken drills, scraper fragments, and pottery sherds from the outside grid outnumber those recovered from the inside grid by a ratio of 4.7:1. The majority of the pottery sherds were in Pit C. The preponderance of chipped stone artifacts occurs within the top 30 centimeters. The most numerous artifacts were recovered from the outside grid, lending support to the idea that artifacts were swept out of the shelter.

The majority of projectile points from Magnolia Spring Shelter are Scallorn and Cahokia Notched, representative of the Highland Aspect of the Late Woodland/Early Mississippian Period as defined by Chapman (1948). Large points, including Langtry and Rice Side Notched (Bray 1956: 131; Marshall 1958: 129), were found in the same stratigraphic units as the small points. However, Langtry and Rice Side Notched are associated with all cultural periods from Late Archaic through Early Mississippian (Marshall 1958); here they may represent an as yet undefined Archaic component.

A variety of artifacts, including both acute and obtuse angled scrapers, nutting stones, and ceramics are indicative of plant gathering and processing activities, probably by women. The cores, bifaces, preforms, and all flake classes typify chipped stone tool manufacture. The projectile points, knives, and bifaces are evidence of hunting activity.

The variety of artifacts at Magnolia Spring Shelter, taken in combination with the debitage and waste tools, leads us to the following conclusions. First, the array of artifacts representing all types of activities are indicative of a habitation site. This could be a short term occupation, possibly representing several seasonal occupations. The variety of aquatic species may represent a spring habitation. Mammal bones, particularly the white-tailed deer, raccoon, and bison in combination with the nutting stones may be interpreted as a fall camp. Second, the quantities of debitage and waste tools on the outside grid add support to the assumption that trash was swept out of the shelter. If Magnolia Spring Shelter served as a habitation site, it would be expected that the debitage and refuse was swept out of the shelter proper. However, there are several problems with this interpretation. First, the majority of broken artifacts were inside the shelter. This is contrary to the original expectations that refuse would be deposited on the shelter slope. Second, the debitage inside the shelter outnumbers that on the slope by a ratio of 2:1. Again, this contradicts original expectations. Third, the equal percentages of flake classes inside and outside the shelter was unanticipated. Lastly, the bulk of debitage and artifacts was in the 10 to 20 centimeter levels. The quantity of refuse inside the shelter contradicts the use of the shelter as a long term habitation site. Based on the four points listed above, we conclude:

(1) During Woodland times, when the top 30 centimeters of shelter fill were deposited, Magnolia Spring Shelter was used as a temporary camp. This is based on

the presence of ceramics and small arrowpoints in combination with debitage and refuse artifacts within the shelter itself. If the shelter had been a long term habitation debitage site, more debitage should have been present on the slope.

(2) The absence of pottery in the lower levels, along with the presence of large projectile point/knives inside the shelter, coupled with the equal percentages of debitage inside and outside the shelter, leads us to believe these levels represent pre-pottery occupations. The shelter was used for a long period of time probably as a habitation site. During this time refuse was swept out onto the slope as suggested by the debitage counts and percentages.

CARVED ROCK SHELTER, 23SR127

Carved Rock Shelter was first recorded during the winter of 1959. The overhang is on the south slope of a narrow, steep-sided east west trending ravine locally called Cat Hollow. An intermittent creek flows through the ravine, emptying into little Monegaw Creek .25 kilometers to the southeast (Fig. 13). The shelter was named for the outline of a horse that is carved in the sandstone on the west edge of the overhang. Today the surrounding vegetation is dominated by large oak canopy, numerous bushes, and lichen.

The back wall of the shelter is 26 meters long, reaching a maximum width of seven meters (Fig. 14). However, this is deceiving: the back wall is actually a sheer face about seven meters high. Although the face inclines to the north, it offers little protection. The eastern part of the shelter, on the other hand, opens to the northeast and is only 3.5 meters wide and two meters high, but it offers more protection.

A local resident explained to us that Cat Hollow has been a favorite picnic area for generations. She has visited Carved Rock Shelter during the winter when icicles had formed on the overhanging sandstone ledge, giving the appearance of stalactites. The icicles formed a wall in front of the shelter, turning the interior into a refrigerator.

Carl H. Chapman (1965: 404-412) has reported his earlier test excavations in Carved Rock Shelter. Although the date of the work is not given, it was probably during the summer of 1961. A trench (5 x 20 feet) was dug in

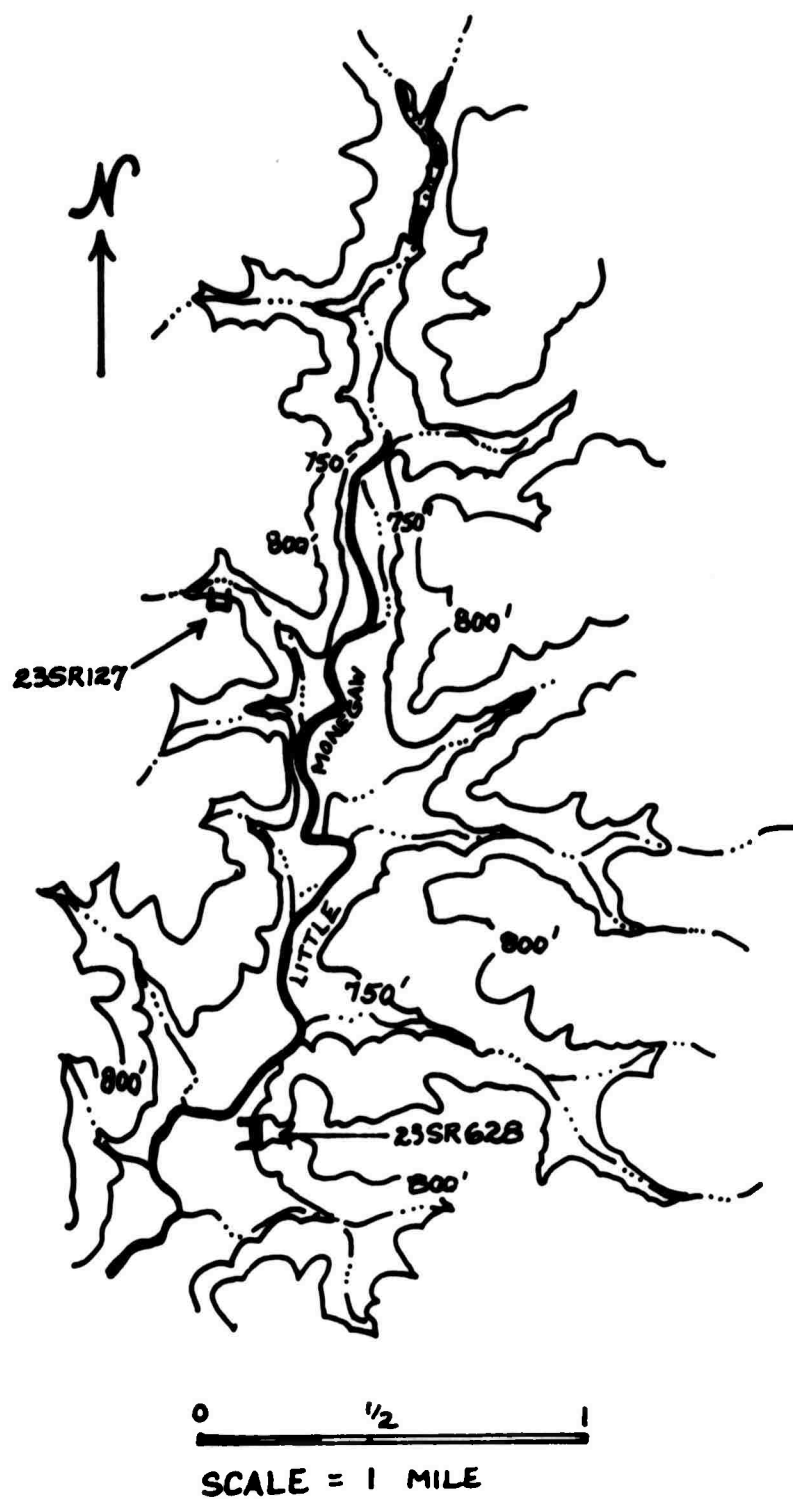


Figure 13. Topographic setting of Carved Rock (23SR127) and Shangri-La Shelters (23SR628).

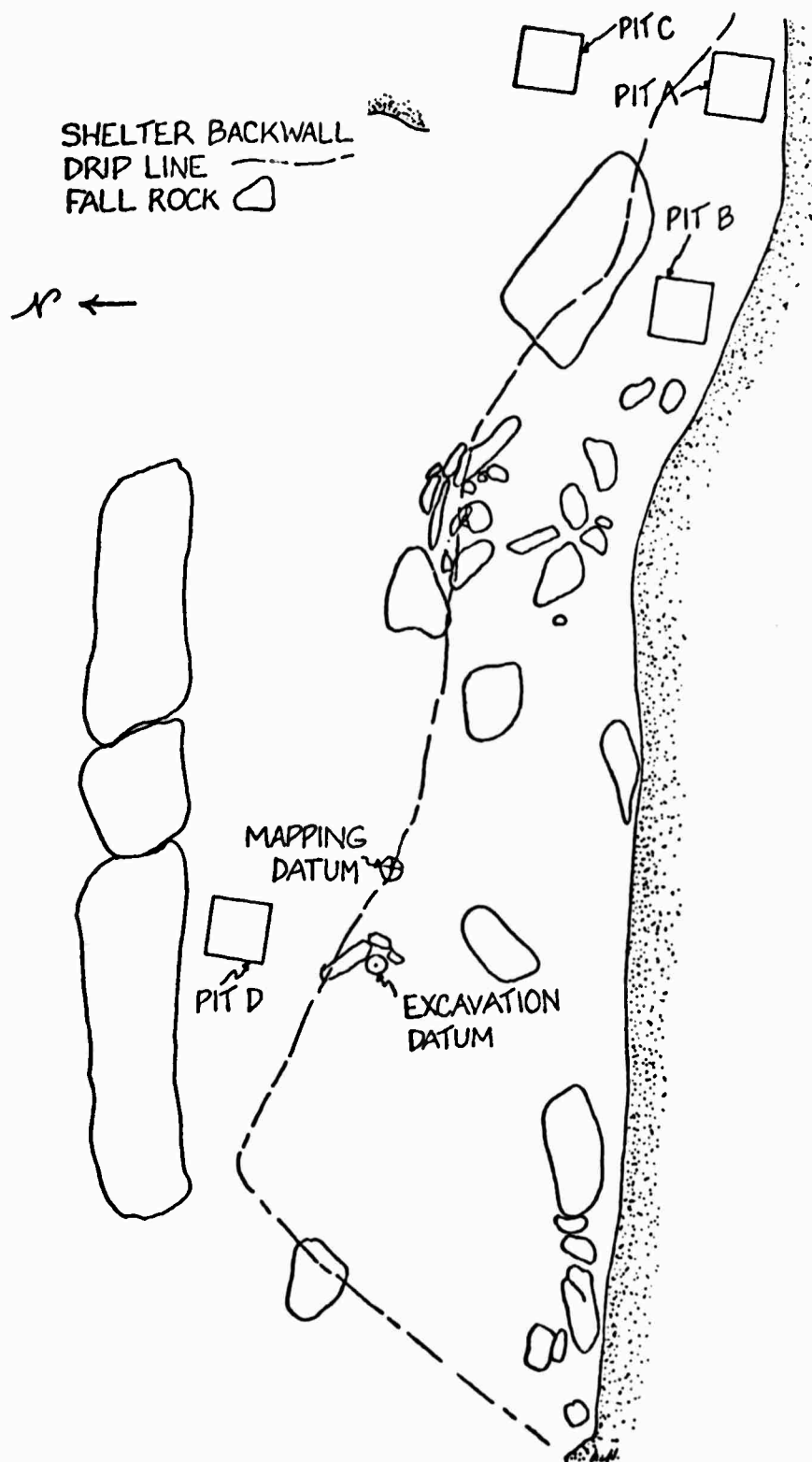


Figure 14. Map of Carved Rock Shelter, 23SR127.
Scale: test pits are one meter square.

the central part of the shelter (just east of the mapping datum on Figure 14). Deposits in the south end of the trench, beneath the shelter roof, were only six inches deep; in the north end of the trench, on the slope, deposits were 12-18 inches in depth.

Large rocks were numerous throughout the unstratified shelter fill. Projectile points recovered by Chapman included Cahokia notched, triangular, corner notched, shallow side notched, and one basal notched. Cahokia notched projectile points were only in the top six inch level. Although Chapman (1965: 406, 409; Fig. 127, d) reported small corner-notched projectile points, he does not call them Scallorn. However, they are similar to projectile points (1965: 463, Fig. 163, f), recovered from Gray Shelter four kilometers southeast of Carved Rock Shelter, which he (1965: 464) termed "Scallorn or Scallorn-like corner notched" arrowpoints later in the report. Other chipped stone tools included "thumbnail scrapers" (1965: 406) and flake scrapers.

A number of clay- or grog-tempered sherds were found, having either plain or cord marked exteriors. One bone awl and a piece of grooved sandstone were also found.

Chapman (1965: 410) concluded that "further excavations might be of real value in separating two pottery components in the area if it were excavated completely."

The 1976 test excavations, conducted during July, consisted of four one meter square test pits A, B, C, and D (Fig. 14). A transit was set up to map the shelter. Artifacts recovered from 23SR127 are reported by class and level in Table 7.

Test B was least productive, revealing only a few flakes. The deposit consisted mainly of decomposing oak

TABLE 7
Carved Rock Shelter (23SR127) Artifacts

Class	Level																Totals																
	0-10cm				10-20cm				20-30cm				30-40cm					40-50cm				50-60cm				60-70cm				70-80cm			
	A	B	C	D	A	B	C	D	A	B	C	D	A	B	C	D		A	B	C	D	A	B	C	D	A	B	C	D				
Projectile points																																	
Point tips																																	
Point midsections																																	
Point bases																																	
Biface fragments																																	
Distal end scrapers																																	
Proximal end scrapers																																	
Scraper fragments																																	
Lateral edge flake																																	
scrapers/knives																																	
Side scrapers																																	
Utilized flake																																	
Uniface																																	
Core																																	
Battered edge																																	
Drill																																	
Graver																																	
Nutting stones																																	
Hematite																																	
Prehistoric ceramics																																	
Plant remains																																	
Shell remains																																	
Faunal remains																																	
Totals	2	0	0	0	1	6	0	2	0	1	7	0	9	1	4	0	4	0	1	9	1	1	8	1	7	1	3	85					

leaves. The pit was closed after digging two levels, at a depth of 20 centimeters, since the pit floor exposed a large fall rock.

Test D, on the western part of the shelter slope, contained a number of flakes and four chipped stone artifacts. Two diagnostic projectile point midsections, one tip, and one core were recovered. The points are small side notched points, possibly Cahokia side notched. The first ten centimeters of the deposit were humic; the next 30 centimeters were of light brown sandy soil; and the last 30 centimeters were basically of yellow sandy fill. The points were recovered from the 40 to 50 centimeter level and the 50 to 60 centimeter level.

Pit A, at the eastern, narrow end of the shelter, was the most productive. The top level was mainly humic above 50 centimeters of sandy yellow fill. Projectile points from Pit A included several small Cahokia notched (20 to 30 cm) and large corner notched points. A number of lateral edge flake scraper/knives, two broken scrapers, one core, several bifaces, and a drill complete the tool assemblage. Two nutting stones and a number of prehistoric ceramic sherds were also recovered.

Pit C was dug to a depth of one meter below the surface, on the north slope in front of the narrow end of the shelter. This was the second most productive pit. The top 20 centimeters were humic, overlying sandy brown fill. The fill changed to yellow at 40 centimeters. A variety of projectile points were recovered, including shallow side notched, contracting stemmed (possibly Gary or Langtry, but the base is broken so it is impossible to determine) and corner notched points distributed throughout the deposit. One Cahokia notched point was

at a depth of 50 centimeters, and several small corner notched points (larger than typical Scallorns) were in the lower levels. Chipped stone artifacts include lateral edge flake-scraper/knives; proximal, distal, end and edge scrapers, cores, and one graver. Some pottery was also recovered.

Identifiable faunal remains include Terrapene sp. (Box turtle) and Testudines spp. (turtle), both specimens from the top 20 centimeters of Pits A and B. Shell fragments were in Pit A (10-20 centimeters).

Intrasite Analysis

The debitage graphs (Fig. 15) illustrate two different modes. The mode inside the shelter is at 20 centimeters; the mode outside is at 50 centimeters. These modes may be explained in several ways. First, they represent two different occupations. Alternatively, the inside mode could be contemporary with the outside mode which has experienced more deposition because of its location on the slope.

The debitage percentages (Table 8) show that the frequencies of flake classes are similar on the inside and the outside of the shelter. The raw numbers of debitage are nearly doubled on the slope compared to those found on the inside of the shelter. The quantity of flakes on the shelter slope lends support to the argument that debris was swept out of the shelter proper. The number of retouch-trimming flakes outside the shelter slope is three times that inside the shelter. It is possible that tool maintenance and biface finishing was

CARVED ROCK SHELTER

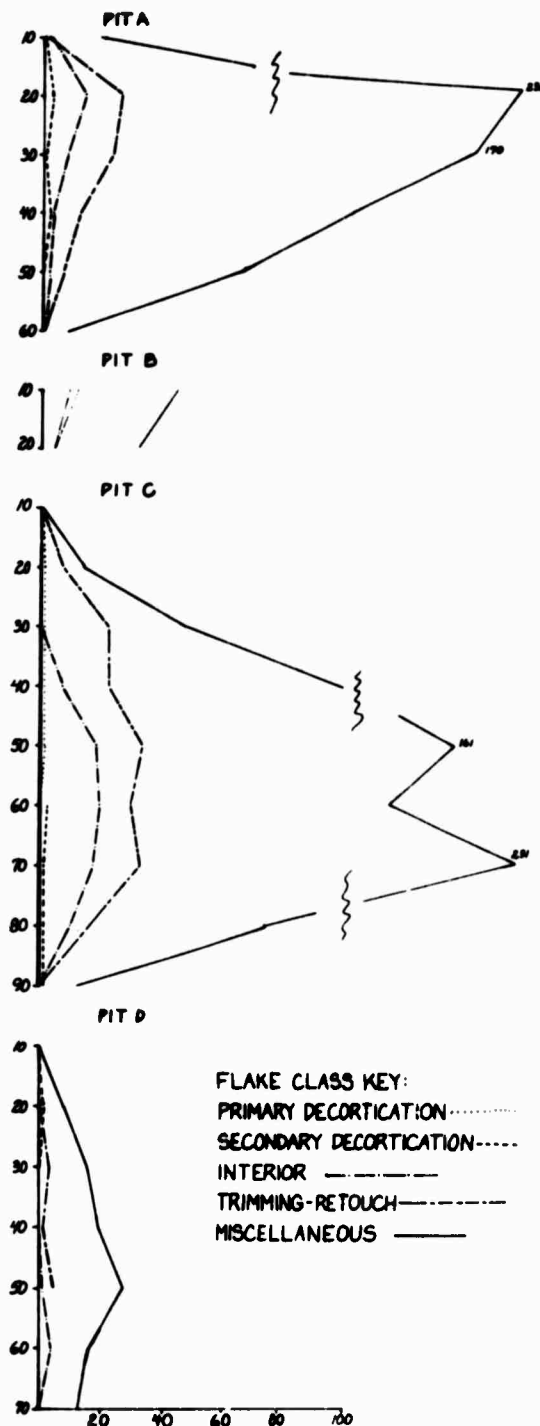


Figure 15. Debitage graphs for Carved Rock Shelter. Presented by arbitrary 10 cm levels for pits A, B, C, and D.

TABLE 8
Carved Rock Shelter (23SR127) Debitage Percentages

Inside shelter

	Total debitage counts	Percents	Total number of whole flakes	Percents
Primary decortication	0	0.0	0	0.0
Secondary decortication	4	.9	4	5.1
Interior flakes	30	7.3	30	38.5
Trimming-retouch flakes	44	10.8	44	56.4
Miscellaneous	328	80.8		
Total	406	~100.	78	~100.

Outside shelter

	Total debitage counts	Percents	Total number of whole flakes	Percents
Primary decortication	4	.4	4	1.9
Secondary decortication	4	.4	4	1.9
Interior flakes	71	7.8	71	33.0
Trimming-retouch flakes	136	14.9	136	63.2
Miscellaneous	692	76.2		
Total	907	~100.	215	~100.

conducted outside the shelter. In this way more light would be available and debitage would not be in the living area.

Table 9 illustrates the ratio of bifacially worked tools to waste flakes. Overall, the ratios are high. Unfortunately, only three levels revealed bifacially worked tools. One of these ratios is low according to both White and Peterson (1969) and Newcomer (1971). The other two levels are high. Two, or about 30 per cent, of the six levels that produced bifaces have low ratios, however, if our alteration of Newcomer's experimentally derived ratio of 1:50 (resulting in a lowering to 1:30) is used, only the 30 centimeter level is low. The 30 centimeter level is low both inside and outside the shelter. This may simply represent a hiatus in biface manufacture, because only two projectile points were recovered from this level. However, some chipped stone tool manufacture or maintenance was certainly conducted. As seventy-five per cent of the levels exhibit high bifacially worked tool to waste flake ratios, and this is taken as evidence of on site chipped stone tool manufacture, it seems that the prehistoric inhabitants of Carved Rock Shelter were making tools at the site.

The waste tool categories including projectile point tips, midsections, bases; drill fragments, broken scrapers, and ceramic fragments are represented by equal total raw numbers from both grids. However, more pottery was present inside the shelter. The top 30 centimeters of the deposit contained the majority of chipped stone artifacts.

The equal numbers of waste artifacts suggest that

23HI246

The site, a small rock shelter, is in an outcrop of Mississippian limestone on the east (right) bank of Bell Branch in Hickory County, Missouri. The legal designation is SE $\frac{1}{4}$ SE $\frac{1}{4}$ NE $\frac{1}{4}$ Sec. 15, T38N, R22W, Fristoe Quadrangle (U.S.G.S. 15 minute series). Beck Shelter (this report) is less than 40 m to the north; Phillips Spring is 1.5 km to the north along the Pomme de Terre River.

The west facing shelter (Figs. 6 and 11, a) is the smallest and southernmost of three overhangs which occur in an outcrop of limestone on the hillslope east of Bell Branch; Beck Shelter is in the same outcrop. Bell Branch, a north flowing intermittent feeder creek, is 16 m below and 25 m west of the site. The creek empties into the Pomme de Terre River about 170 m north of the shelter. Outcrops of chert occur on the hill above the shelter but little chert is present as inclusions in the limestone overhang. Present vegetation is an oak-hickory forest modified by the presence of post oak and red cedar below the shelter; above the site is typical hillslope vegetation.

The maximum dimensions of the shelter are: 18 m north-south and 3.5 m east-west, but the effective area below the overhang is reduced by the presence of large pieces of fall rock and the thinness of the overhang at the northern and southern extremes. The floor of the shelter slopes from the back wall to the drip line (declination of 50 cm over 3.5 m) and dips from the north to the south. Beyond the drip line, the hill slopes steeply to Bell Branch.

The site was mapped using a line level and tapes and an arbitrary datum was set. Two adjacent 1.5 x 1.5 m squares were dug near the center of the shelter floor and

similar activities were carried on both inside and outside the shelter. The surprisingly similar percents of debitage lend support to this contention.

SHANGRI-LA SHELTER, 23SR628

Shangri-La Shelter was discovered by the authors in July 1976. The shelter is on the west slope of a dissected plateau above the present day floodplain of Little Monegaw Creek. The western edge of the floodplain, at the foot of the plateau slope, has wet soil which supports a dense growth of canary grass, which continues up the slope for over 100 meters to the level of the shelter. The grass thins out towards the top of the plateau, which is a large sandstone outcrop with lichen, fungi, and scattered oak trees. Seen from the bank of Little Monegaw Creek, the shelter looked so picturesque it was named Shangri-La (Fig. 16). Little Monegaw Creek empties into the Osage River 5 kilometers to the south.

The shelter was formed by a small sandstone outcrop extending parallel to the slope for about six meters. It opens to the northwest and has a maximum overhang of two and one half meters at the north end and a minimum of one half meter at the south end. The floor is about one and one half meters below the shelter roof. Since Shangri-La Shelter was one of the smallest shelters we had seen, we decided to test it. Another important feature of the shelter was its undisturbed appearance; it had no pot holes or litter.

A transit was set up at the south end of the shelter to map the site. Two grids were drawn on the map, the first inside the shelter and the other was drawn on the slope. Since no fall rock or trees obstructed the site, two test pits from each grid were selected by random

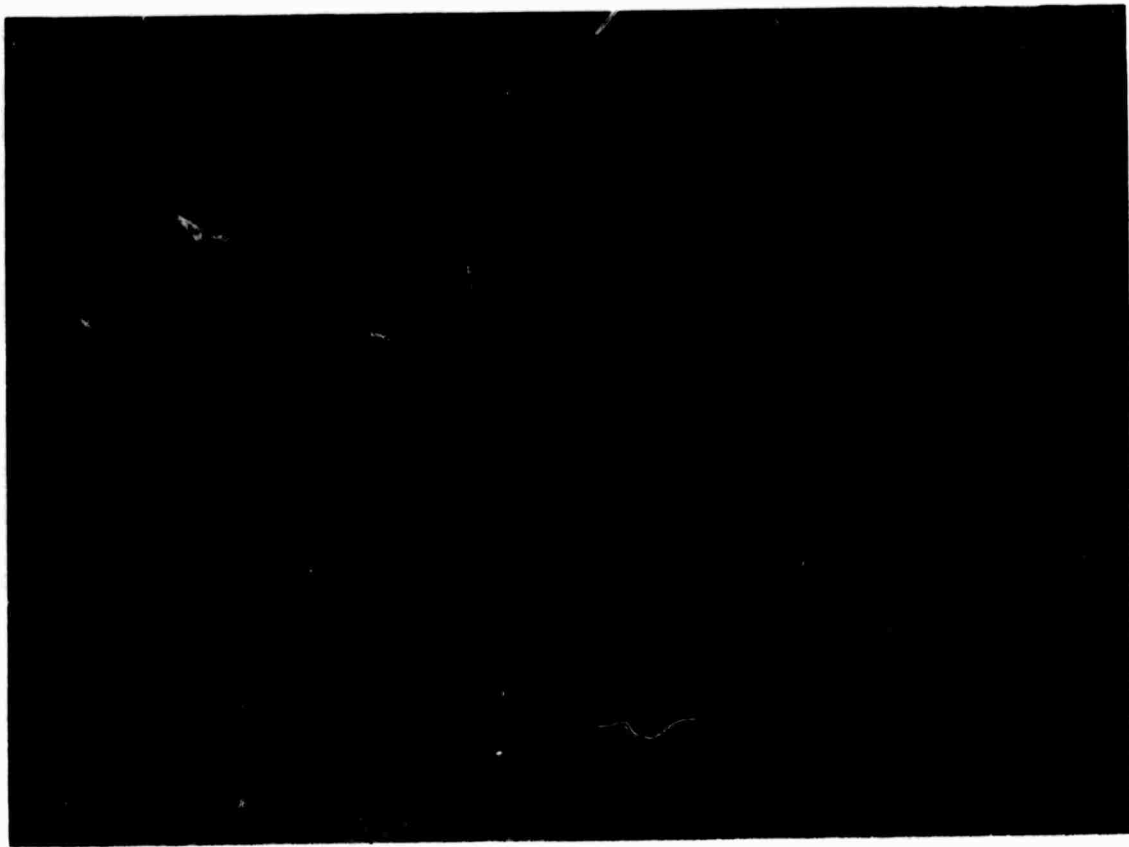


Figure 16. View of Shangri-La Shelter during excavation.

number. Pits A and B were staked out inside the shelter, and Pits C and D were on the slope (Fig. 17).

Although Shangri-La Shelter was one of the smallest shelters we visited, it produced a diversified assemblage of artifacts. These are presented by artifact class and pit level in Table 10.

Pit A was the most productive, containing a number of projectile points, biface fragments, scrapers, utilized flakes, two nutting stones, animal bone, and shell. The projectile points are small and corner notched, similar to Scallorn types. Charcoal flecks were found at a depth of 33 centimeters.

Pit B, although not as productive as test pit A, was dug at the narrower, south end of the shelter. The first ten centimeters contained only flakes. The next level revealed a small corn cob. We do not yet know if it is prehistoric. Charcoal flecks appeared below 20 centimeters. Artifacts from Pit B include a small arrow-point base, biface fragments, a core, rubbed hematite, debitage, animal bone, and shell.

Pit C was dug on the slope, parallel to Pit A. Four small projectile point fragments, biface fragments, one scraper, utilized flakes, debitage; one incised rim sherd; one huge nutting stone (measuring 24 x 36 centimeters), animal bone, snail shells, and shell were recovered. The one complete projectile point, found at 41 centimeters, is a small corner notched Scallorn point. Charcoal was recovered below 40 centimeters.

Pit D also contained a variety of artifacts. This, the deepest test pit, was dug to a depth of 70 centimeters. A small sandstone abrader was recovered at 14.5 centimeters. Two small projectile points, bifaces, one

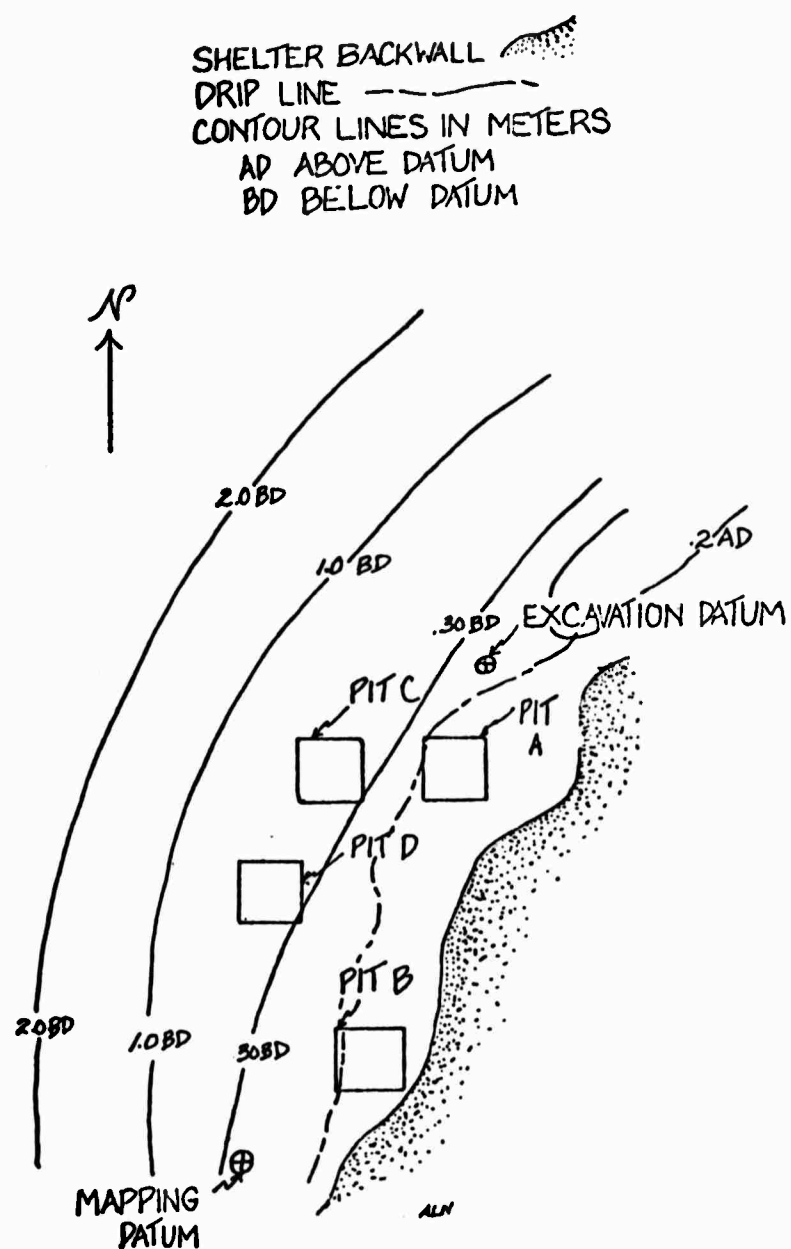


Figure 17. Map of Shangri-La Shelter,
 23SR628. Scale: test pits are one
 meter square.

TABLE 16
Artifacts, 23HI246: Measurements (mm)

Group	Specimen	Total Length	Blade Length	Haft Length	Blade Width	Haft Width	Base Width	Blade Thickness	Haft Thickness	Weight (gm)	Angle A (°)	Angle B (°)	Wear	Remarks
26	8-1	53	34	19	32	22	16	8	6	11.5	30*	60*	Er	Whole, Fig. 14, f
27	5-3	-	na	na	na	na	20	5	na	-	40	60	Er	Transverse stress fracture heat treated, Fig. 14, c
29	9-1	-	na	na	na	na	41	15	na	-	45	na	no	Fig. 14, e
48	5-4	-	na	na	na	na	-	-	na	-	75	na	no	

na Not applicable

* Edge angles given are for the blade edges; Angle A = 25; Angle B = 60 for graver spur.

Er Edge rounding

scraper, one core, utilized flakes, debitage, acorns, and shell were recovered. Like the other projectile points from Shangri-La, these too are small corner notched Scallorn arrowheads.

The stratigraphy at Shangri-La is quite uniform beneath the sandstone overhang and down the slope. At the base of the rear sandstone wall of the shelter was a gray shale stratum. The top ten centimeters of the deposit contained small, gray shale fragments scattered throughout the fill. The stratigraphy in Pits A and B, inside the shelter, consisted of a gray sandy fill to a depth of nearly 50 centimeters, overlying decomposing shale. At 40 centimeters in Pit C a platy stratum was encountered. Some of these plates had a fibrous structure and waxy lustre similar to that of serpentine. Others had the appearance of dry, cracked mud. A layer of this material was sifted, although no artifacts were recovered. The nutting stone in Pit C was parallel to the slope of the hill, resting on the platy material. By using an auger we found that this layer continued for at least another 40 centimeters. At 40 centimeters Pit D was half obstructed by large sandstone fall rock. The 40 to 50 centimeter level had just a small amount of fill between the rocks. The fill in Pit D also had the platy structure at a depth of 70 cm.

Identifiable faunal remains include Sylvilagus floridana (Eastern Cottontail), Marmota monax (Woodchuck), and other small mammals from Pits A and B. The bone from Pits C and D was not identified.

Table 11 suggests that the bifacially worked tool to waste flake ratios are low. However, if our alteration

TABLE 17
Distribution of Debitage, 23HI246

	Primary Decortication		Flakes Secondary Decortication		Interior		Shatter	
	W	B	W	B	W	B	Cortical	Interior
General Surface	-	2	-	-	-	-	26*	-
Square 1								
0-10 cm BS	-	-	2	1	2	10	4	2
10-20 cm BS	-	-	-	-	-	-	2	6
20-30 cm BS	1	-	1	1	4	5	5	7
Square 2								
0-10 cm BS	2	-	1	-	10	30	1	9
10-20 cm BS	-	-	1	-	6	13	1	3
Fea. 1	-	-	-	-	-	1	-	1
20-30 cm BS	-	-	-	-	-	-	-	1
Totals	3	2	5	2	22	59	39	29

* Probably represents colluvial chert

W = Whole

B = Broken

of Newcomer's (1971) ratio is used, that is, 1:30 instead of 1:50 and 1:25 proposed by White and Peterson (1969), the evidence suggests that on site chipped stone tool manufacture did take place at Shangri-La.

Intrasite Analysis

The debitage graphs (Fig. 18) do not illustrate specific modes as do those for Gray, Carved Rock, and Magnolia Spring shelters. Miscellaneous debitage including shatter and broken flakes predominate. In Pits A and B, inside the shelter, the modes are in the lower levels of the pits. The outside Pits C and D have different modes. Pit C has its mode at the lowest level, 50 centimeters. The mode for Pit D is at 30 centimeters. This stratigraphically higher mode may be related to the fall rock obstruction in the pit.

A total of 783 pieces of debitage (Table 12) were examined. The raw numbers of debitage recovered from both the inside and outside grids is similar. Consequently, the percentages are alike. The greatest number of flakes from the test excavations are trimming-retouch flakes. This, in combination with the absence and scarcity of primary and secondary flakes, and the presence of only two cores, leads us to believe that tool manufacture may not be based on local chert cobbles. In the absence of this evidence it seems likely that preforms were carried onto the site for subsequent work. Perhaps the abundance of trimming-retouch flakes represents tool maintenance. Alternatively, cortex may have been removed at the collection site.

SHANGRI-LA SHELTER

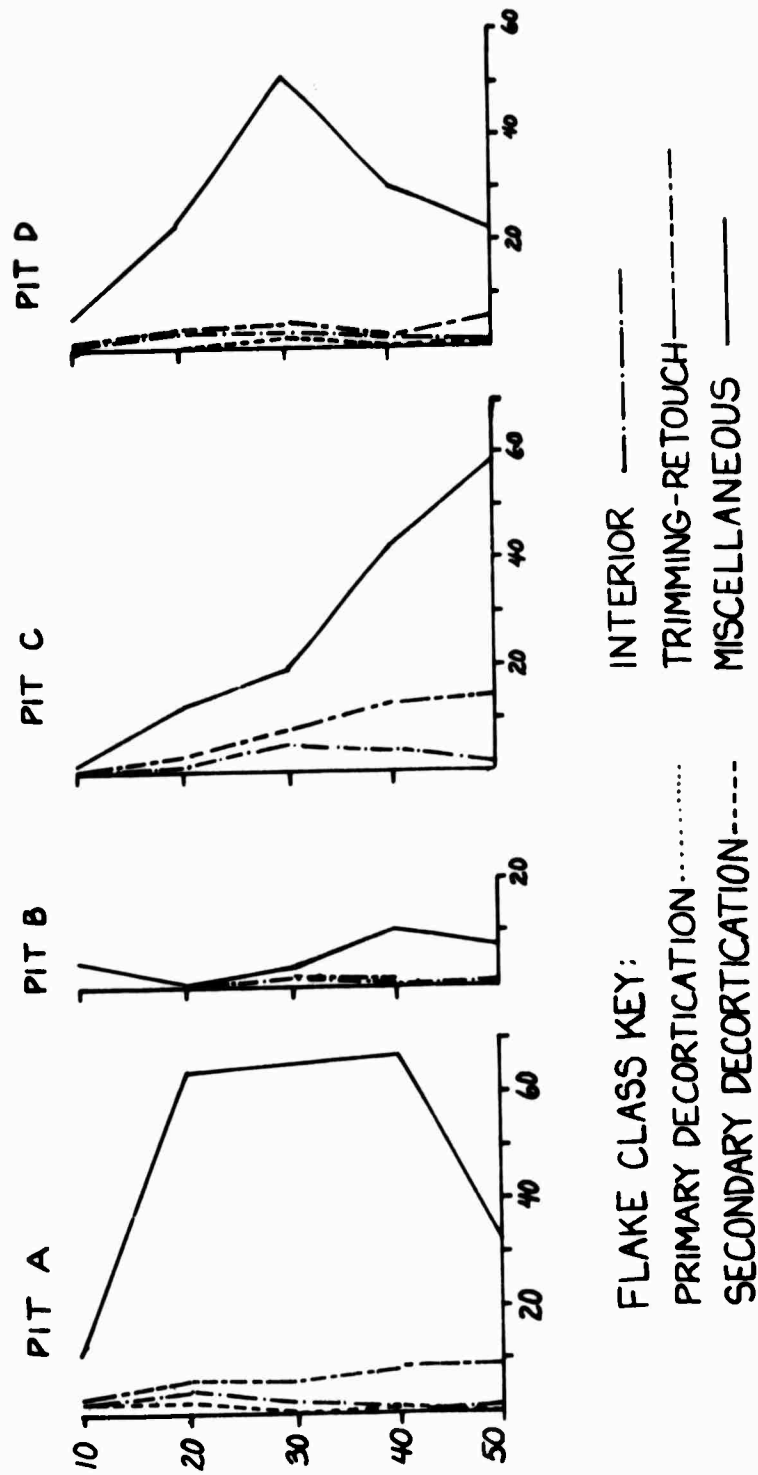


Figure 18. Debitage graph of Shangri-La Shelter. Presented by arbitrary 10 cm levels for Pits A, B, C, and D.

TABLE 12

Shangri-La Shelter (23SR628) Debitage Percentages

Inside shelter

	Total debitage counts	Percents	Total number of whole flakes	Percents
Primary decortication	0	0.0	0	0.0
Secondary decortication	5	1.6	5	8.7
Interior flakes	13	4.0	13	22.8
Trimming-retouch flakes	39	12.2	39	68.4
Miscellaneous	263	82.2		
Total	320	100.	57	100.

Outside shelter

	Total debitage counts	Percents	Total number of whole flakes	Percents
Primary decortication	0	0.0	0	0.0
Secondary decortication	2	.6	2	2.8
Interior flakes	19	5.7	19	26.7
Trimming-retouch flakes	50	14.9	50	70.4
Miscellaneous	264	78.8		
Total	335	100.	71	100.

Waste artifacts at Shangri-La Shelter include projectile point midsections and bases, scraper fragments, and pottery. These occur more abundantly on the slope by a ratio of 2:1. This supports the proposition that refuse was swept out of the shelter. Overall artifact density remains constant throughout the top 50 centimeters of deposit.

More artifacts were found outside the shelter, which supports the discard assumption. Unfortunately, the approximately equal debitage counts from the two grids do not fit this interpretation. We interpret the equal numbers of debitage to mean that waste flakes were not swept out of the shelter. This site may represent an occupation where the inhabitants were not concerned about keeping the interior part of the shelter clean. If Shangri-La represents a brief occupation, this is a strong possibility. The variety of tools found at the site, including nutting stones and highly beveled scrapers, are probably indicative of female activities. Debitage in combination with cores and bifaces in addition to the biface to waste flake ratios reflect some tool manufacture and maintenance.

Based on the uniformity of projectile points, all small corner notched Scallorns, artifact assemblage, and debitage, we infer that Shangri-La Shelter represents a Late Woodland occupation. The presence of one incised rim sherd supports this interpretation. As the 1976 work only excavated four test squares, subsequent work would probably unearth more sherds. The rather light density of artifacts, low percentages of flakes with cortex, and equal numbers of debitage inside the shelter and on the slope leads us to conclude that Shangri-La Shelter was used as a short term habitation site in Late Woodland times.

COPPERHEAD ACRES SHELTER, 23SR631

Copperhead Acres Shelter is on a south-facing slope ten meters above an intermittent stream (which was dry during the time of our testing) that empties into Turkey Creek .3 kilometers south of the site. Today the local environment around the site may be characterized as a cedar glade. Most of the trees are cedar with a few scattered oak trees. Grass cover was extremely thin.

The shelter itself is beneath a small sandstone ledge, outcropping parallel to the slope for about fourteen meters. It opens to the south with a maximum overhang of 2.5 meters at the east end. This part of the shelter would provide the best cover from inclement weather, although it would require the inhabitants to crawl into it. The remainder of the site has one meter or less of overhang to provide protection. The present day floor was level and about one meter below the roof. There was no evidence of looting, possibly the result of the small size of the shelter and the near absence of artifacts on its surface. The undisturbed nature of the site, as well as its small size, led us to decide the shelter was appropriate for testing.

The transit was set at the west end of the shelter, and two grids were drawn on the map, the first inside the shelter overhang, and the second on the slope outside. Since no fall rock obstructed the site, two test pits were randomly selected from each grid for excavation. Pits A and C were chosen beneath the overhang and Pits B and D were staked out on the slope (Fig. 19).

The tool assemblages from the shelter are presented by artifact class and pit level (Table 13).

Activities that took place there include: hunting, plant and shellfish gathering, fire related activity, wood working, hide working or butchering, and lithic reduction (both of raw materials and preforms). The small shelter size and sparsity of cultural material indicates it is a temporary campsite utilized by a small group of people (probably on a number of occasions).

It is recommended that the charred wood from Feature 1 be submitted for radiocarbon dating. Should the date suggest an early ceramic component, further excavations would be recommended since that period is poorly known in the area.

Pit A, the second most productive pit, contained two small arrowpoints, various scrapers, biface fragments, an exhausted core, debitage, and two pieces of pottery. One of the arrowpoints is identified as Cahokia notched (Chapman 1965: 457). Charcoal flecks were found at a depth of 14 centimeters.

Pit B, the most productive pit, produced six pottery sherds and a variety of chipped stone tools. These include two small projectile point fragments, scrapers, a worked flake, a biface fragment, an exhausted core, and debitage. Plant remains were found in every level of this pit. One small complete projectile point is identified as a corner notched Scallorn. A few charcoal flecks were noted in the 10-20 cm level along with a small fragment of bone.

Pit C was dug in the east end of the shelter where the overhang reached its maximum extent. The 0 to 10 cm level revealed three small Scallorn projectile points. The fourth point found in this level is problematic. It is a crudely shaped, side notched specimen which is twice the length and thickness of other stratigraphically associated projectiles. Chapman (1975: 216) identifies points of this form as side notched dart points common in the Late Archaic. Since no cultural mixing or disturbance by looters is assumed, alternative explanations must be offered to explain an "Archaic" point in a Woodland assemblage. The point may have been found and used by the Woodland inhabitants of Copperhead Acres Shelter, or the point may represent part of the range of variability in Woodland technology. The second interpretation is the one favored here. The level also yielded a flake scraper, a utilized flake, debitage, and plant remains.

TABLE 13

Copperhead Acres Shelter (23SR131) Artifacts

Class	Level												Totals	
	Surface	0-10 cm				10-20 cm				20-30 cm				
		A	B	C	D	A	B	C	D	A	B	C		D
Projectile points	1	2	1	4					1					9
Point tips	1				1									2
Point bases					1									1
Distal end scrapers					1	1			1					3
Lateral edge flake scrapers/ knives	1	1	1	1					1	1				6
Unifaces	1				1									2
Utilized flakes					1	1	1		1			1		5
Biface fragments	1	2	1					1						5
Prehistoric ceramics					6			2	2					10
Cores	1	1	1		1									4
Bullet shells	1													1
Faunal remains									x					
Plant remains					x	x	x		x	x		x	x	
Totals	7	8	14	6	2	2	1	6	1	0	0	1	0	48

In the 10 to 20 cm level of Pit C was a large corner notched point, various scrapers, debitage, two pieces of pottery and plant remains. The debitage density was drastically reduced in the next 10 cm level, which yielded only one utilized flake. Plant remains were still in evidence at this level.

Pit D produced three artifacts, two in the first level, and one in the second level, one of them diagnostic. Plant remains were found in the first and third levels.

Stratigraphy at Copperhead Acres Shelter was similar throughout the site. The surface was covered with decaying leaves and small sticks. The fill at the surface was composed of very fine sand. Four centimeters below the surface, the sand became darker as a result of moisture. Numerous sandstone rocks appeared at a depth of ten cm. Near the thirty cm depth, the sand began to turn bright yellow, eroding bedrock, so excavation was stopped in all of the pits when this color change occurred.

Table 14 illustrates the ratios of waste flakes to bifacially worked tools at Copperhead Acres. Only one of these is low according to the experimental data recorded by Newcomer (1971). If our alteration, 1:30, of his figure (that is 1:50) is used as a guide, this level is high. This ratio is higher than those described by White and Peterson (1969). As with the overall debitage, the average ratio for both inside and outside the shelter is similar. Both are twice the requirement of on site biface manufacture.

TABLE 14

Ratios of Bifacially Worked Tools to Waste Flakes
Copperhead Acres Shelter, 23SR631

<u>Levels in Centimeters</u>	<u>Inside Shelter</u>	<u>Outside Shelter</u>
10	1:35.1**	1:53.83
20	1:130	1:116
30	0:36	0:49
40		0:3
Averages	1:82	1:84

** Below limit set by Newcomer (1971)

Intrasite Analysis

Copperhead Acres represents the shelter with the shallowest deposits. Consequently the debitage graphs show no sequence of flakes, nor any distinct modes, so are not illustrated here.

The debitage counts and percentages presented in Table 15 show that 985 flakes were recovered from the test squares. Approximately equal numbers of flakes were found both inside and outside the shelter. A few more were recovered from the inside Pits A and C. Primary and secondary flakes make up 12% of the total whole flake assemblage. While this site has the highest percentage of cortex flakes, at present it is difficult to assess the quantity of cortex necessary to definitely reflect a chipped stone tool technology based on creek cobbles. The overwhelming majority of trimming-retouch flakes suggest that either preforms were being worked, or that maintenance of tools both inside and outside the shelter may be interpreted as representing the same behavioral processes ongoing in both areas.

Representing waste artifacts are projectile point tips and bases; biface fragments, broken scrapers, and prehistoric pottery sherds. Broken artifacts inside the shelter outnumber those on the slope by a ratio of 5:1. This implies that waste was not swept out of the shelter.

In summary, it is necessary to review the artifact assemblage in combination with the debitage. Chipped stone tools representing hunting, butchering, and tool manufacture are all present. The presence of pottery and scrapers is probably indicative of female activities.

TABLE 15
Copperhead Acres Shelter (23SR131) Debitage Percentages

Inside shelter

	Total debitage counts	Percents	Total number of whole flakes	Percents
Primary decortication	2	.4	2	1.3
Secondary decortication	10	2.0	10	6.5
Interior flakes	30	5.9	30	19.5
Trimming-retouch flakes	112	22.0	112	72.7
Miscellaneous	356	69.8		
Total	510	~100.	154	~100.

Outside shelter

	Total debitage counts	Percents	Total number of whole flakes	Percents
Primary decortication	3	.6	3	4.5
Secondary decortication	10	2.1	10	15.2
Interior flakes	19	4.0	19	28.8
Trimming-retouch flakes	34	7.2	34	51.5
Miscellaneous	409	86.1		
Total	475	~100.	66	~100.

Cahokia and Scallorn projectile points represent the Late Woodland period. One possible Archaic projectile point was also recovered. We interpret the equal amounts of debitage in association with a majority of waste tools inside the shelter as evidence of a short term occupation. If a long term occupation was represented, more waste and debitage would be expected on the slope.

ROCKY HOLLOW SHELTER, 23SR626

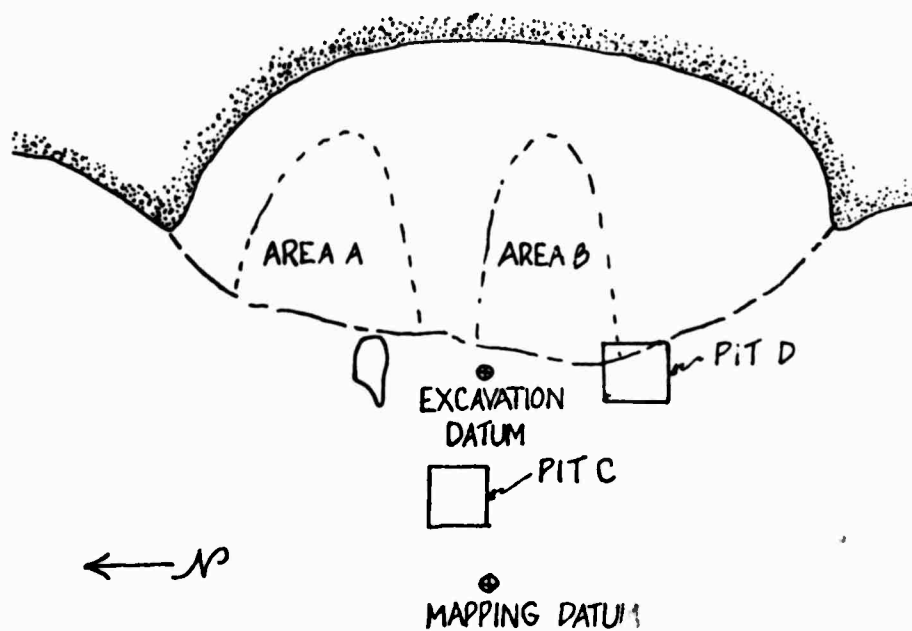
Rocky Hollow Shelter was discovered by the authors in August 1976. It lies on the south slope of a small, narrow, sandstone valley, carrying an intermittent, first order stream of the Sac River. The stream empties into Allen Branch .75 km south of the shelter. Today the shelter is on an ecotone between oak-hickory forest and open prairie.

The shelter is beneath a small sandstone outcrop extending parallel to the slope for about nine meters. It opens to the west facing a large, grassy floodplain. The maximum shelter overhang is four meters wide and is two meters high (Fig. 20).

The shelter appeared to be undisturbed, and an accumulation of dead leaves and branches covered the floor surface. Only in one small area immediately in front of the shelter was the soil visible; several stone tools were found there. The decision to test the shelter was based on its pristine condition.

A transit was set in front of the shelter for mapping purposes. During the mapping, some crew members cleared the vegetal debris away from the shelter. Two large irregular features were observed after the shelter floor was exposed and several bottles and beer cans were found. These features resembled back dirt piles a half meter high. The remaining floor of the shelter was almost flat.

Although it was now obvious that the shelter had been looted, large amounts of lithic debris were noted



23SR626
 ROCKY HOLLOW SHELTER
 SCALE: 1 CM = 1 M
 SHELTER BACKWALL
 DRIP LINE
 FALL ROCK

Fig. 20. Map of Rocky Hollow Shelter, 23SR626.

on the surface of the two features. Due to the quantity of cultural material left on the surface, it was decided to continue the test of Rocky Hollow Shelter.

Two grids were drawn on the shelter map, the first inside the shelter, the second on the floodplain immediately in front of the shelter. Two test pits from each grid were selected for excavation by random number. Pits A and B were staked out inside the shelter, and Pits C and D were set up on the floodplain. After a short time it became obvious that looting had all but destroyed the integrity of the area of Pits A and B. The testing strategy was then altered to recover those cultural remains left by the looters. Pits C and D were dug to undisturbed fill.

Although Rocky Hollow Shelter had been severely disturbed by looters, it produced the largest quantity of artifacts from any shelter tested during the season. This posed an interesting question regarding looting behavior at Rocky Hollow Shelter. First, we know that the looters used screens to sift the deposits because of the fine texture, even consistency, and characteristic lumps of the soil in their backdirt. If this is so, the looters were extremely selective of the artifacts they wished to retain. An alternative explanation is that they were not interested in Indian relics themselves and that no artifacts were removed from the site. The residents of St. Clair County openly acknowledge their pursuit of buried gold and silver thought to be hidden by outlaws in the late 19th century.

The looters did not excavate beyond the dripline; consequently, the area immediately in front of the shelter was intact. The types of artifacts found in

the two test pits on the slope are similar to those found beneath the shelter, suggesting that the artifacts at Rocky Hollow Shelter are representative of the former total tool assemblage.

Since the entire floor area inside Rocky Hollow Shelter had been disturbed, the fill was shoveled out and screened. Pits C and D were excavated by trowel in arbitrary 10 centimeter levels.

The excavation of the first backdirt area in the shelter produced a wealth of artifacts. These include 1 bullet case, 46 projectile points and fragments, 25 biface fragments, 9 exhausted cores, 3 blade/knives, 2 gravers, 4 proximal end scrapers, 4 side scrapers, 22 scraper fragments, 18 lateral edge flake scraper/knives, 8 distal end scrapers, 32 pottery sherds, 55 fragments of mussel shell, 339 bone fragments, 2 pieces of hematite, and various floral material, basically acorns. All of the projectile points are classified as small, side-notched Cahokia points (Chapman 1965: 467).

The second backdirt area was also quite productive. Artifacts found in this area included 14 projectile points and fragments, 9 biface fragments, 2 exhausted cores, 3 blade/knives, 5 gravers, 1 proximal end scraper, 9 scraper fragments, 13 lateral edge flake scraper/knives, 9 distal end scrapers, 24 pieces of pottery, 655 fragments of bone, 42 pieces of mussel shell, 500 pieces of floral material (of which 97 pieces were charred) and one piece of hematite. All of the projectile points in this area are small side notched Cahokia points, except for one corner-notched Woodland point.

Pit C, dug directly in front of the shelter on the grassy floodplain, was the most productive of the test

squares on the slope. The top ten centimeters contained decomposing oak leaves, branches, and roots. One scraper fragment and one sandstone abrader were in this level. The second level consisted of a dark brown, sandy fill. Artifacts include one scraper fragment, two worked flakes, one core, and one cord marked body sherd. One small projectile point base was recovered from the next level. Small flecks of charcoal appeared at 30 cm. At 35 cm yellow fill was reached. Artifacts include one small side notched Cahokia point, two point fragments, and one proximal end scraper fragment. Although the last level was 10 cm deep, cultural material was only found in its top 2 cm. One small side notched, square-based projectile point base, and one point tip were recovered.

Pit D, on the shelter dripline, produced three small projectile point bases.

A number of bone fragments were in Pits C and D, but they were very small. All species identified are from the backdirt areas. Mollusks include Three-ridge (Amblema costata), Mussel (Quadrula sp.), Pig toe (Pleurobema cordatum), Black Sand-shell (Ligumia recta), and Pink Heel-splitter (Proptera alata). Two turtle bones were found, one of them of the Box turtle (Terrapene sp.). Birds include swan (Olor sp.), duck (Anatinae/Aythinae spp.), grouse/prairie chicken (Tetraonidae spp.), and the Great Horned Owl (cf. Bubo virginianus). The greatest number of bones represent mammals: opossum (Didelphis marsupialis), Eastern mole (Scalopus aquaticus), Eastern cottontail (Sylvilagus floridana), Plains pocket gopher (Geomys bursarius), Coyote/dog (Canis latrans/familiaris), raccoon (Procyon lotor), skunk (Mephitinae spp.), White-tailed deer (Odocoileus virginianus), bison (Bison bison),

and Wapiti/deer/bison (Ungulata spp.). Fifty deer bone fragments were recovered, representing 3 individuals; and two pieces of raccoon bone, representing 2 individuals.

Since Rocky Hollow was not tested in the same way as the other five shelters, the usual bifacially worked tool to waste flake ratios for ten centimeter levels were not calculated. Instead, one ratio based on combined totals of biface tools to waste flakes, was calculated. This ratio, 1:32.04, is similar to those suggested by White and Peterson (1969) as well as our adaptation of Newcomer's experimentally derived ratio.

Intrasite Analysis

A total of 3234 pieces of debitage (Table 16) recovered from the test squares and shelter interior were analyzed. The debitage class percentages are similar to those recorded for the other five rock shelters discussed earlier in this study. Primary and secondary flakes compose 10.9% of the whole flake assemblage. This ranks second to Copperhead Acres for the site with most cobble cortex. Trimming-retouch flakes make up the largest debitage class, 60%.

A variety of chipped stone artifacts, including lateral edge flake/scrapper knives, modified blade knives, graters, distal end scrapers, proximal end scrapers, side scrapers, projectile points, bifaces, and cores were represented at the site: 225 diagnostic chipped stone tools were analyzed. Of these 65.2% were broken. Cortex was found on 25% of the combined chipped stone tool assemblage. More diagnostic artifacts were recovered

TABLE 16

Rocky Hollow (23SR626) Debitage Percentages

Inside shelter

	Total debitage counts	Percents	Total number of whole flakes	Percents
Primary decortication	14	.4	14	1.8
Secondary decortication	69	2.2	69	8.8
Interior flakes	229	7.3	229	29.3
Trimming-retouch flakes	469	14.9	469	60.0
Miscellaneous	2352	75.0		
Total	3133	100	781	100

Outside shelter

	Total debitage counts	Percents	Total number of whole flakes	Percents
Primary decortication	2	2.0	2	25.0
Secondary decortication	1	1.0	1	12.5
Interior flakes	1	1.0	1	12.5
Trimming-retouch flakes	4	4.0	4	50.0
Miscellaneous	93	92.0		
Total	101	100.0	8	100.0

from Rocky Hollow than any other shelter. The percentages of broken artifacts as well as those still retain cortex are the greatest of all sites presented here. Tabulations of breakage, lithic flaws, and presence of cortex are presented for each artifact class (Table 17).

Over half of the identifiable scrapers still retain cortex on their dorsal surfaces. It is possible that cortex was left on the scraper to provide a better grip. Bordes, in his summary of Old World tools, illustrates a "knife with natural back" (Bordes 1968: Fig. 35, No. 6) in the Denticulate Mousterian Series. This natural back is cortex. Cortex appears on many of his scrapers (see Figs. 34, No. 1, 36, No. 3; and 54, No. 12). Twenty-nine per cent of the lateral edge flake/scraper knives exhibited cortex, as did nearly 31.25% of the modified blades. The high percentage of cortex backed tools suggests that some significance may be associated with the cortex, although no definite explanation is possible. Rocky Hollow stands alone in this respect, so future work would undoubtedly be helpful.

The uniformity of projectile points is unexpected. Only 15.9% of the projectile points are longer than two centimeters. Most are small Scallorn and Cahokia points. A variety of basal shaping and notching is present. Thirty per cent of these small projectiles appear to be made on trimming-retouch flakes. Many exhibit only slight retouch along their edges, sometimes on one surface only. Only 2.89% of the flakes retain cortex, adding support to the proposal that these points were made from trimming-retouch flakes.

Rocky Hollow Shelter is very near a small, intermittent creek, the bed of which is lined with cobbles.

TABLE 17
Rocky Hollow Shelter Lithic Artifacts

Artifact class	total	broken	percents	flaws*	percents	cortex	percents
core	15	11	73.3	0	0	14	93.3
lateral edge flake/ scraper knife	31	21	67.7	14	45.0	9	29.0
distal end scraper	17	11	64.7	14	82.3	9	52.9
proximal end scraper	5	3	60.0	5	100.0	3	60.0
scraper fragment	32	32	100.0	16	50.0	3	9.3
side scraper	8	5	62.5%	5	62.5	5	62.5
modified blade	6	1	16.6	5	31.25	5	31.25
graver	7	6	85.7	2	28.5	0	0
biface fragment	35	32	91.4	32	91.4	7	20.0
projectile point	69	55	79.7	52	75.3	2	2.89

* flaws include all fossils, quartz crystal inclusions, etc.

Since cortex on the flakes and chipped stone artifacts appears so high, this chipped stone tool industry may be based on creek cobbles. No whole creek cobbles were found during the excavation, although broken cobbles were recovered. Some small stream gravels were found in the lowest levels of Pit C. Portions of larger cobbles were recovered. Inhabitants of the shelter could have simply walked down to the creek and knocked a flake off a cobble to see what the interior was like. If it appeared workable, the cobble was probably brought back to the shelter. The broken cobbles in combination with the high percentages of fossil and crystal inclusions in the chert make it seem unlikely that the material was transported from a quarry. If material (particularly preforms) was transported to the site, little cortex should be present. As it is, 93.3% of the cores retain cortex and bifaces have 20%. This is suggestive of a cobble industry. This is testable: cobbles could be measured and chipped. The flakes could be analyzed to see what proportion has cortex. Additional shelters could also be excavated to see if Rocky Hollow is truly unusual.

In conclusion, the presence of prehistoric ceramics and small Cahokia and Scallorn projectile points at Rocky Hollow Shelter is indicative of a Late Woodland occupation. The diversity of the tool assemblage, including all types of chipped stone tools and an abrader, suggests that this shelter served as a habitation site. The abundance of cortex at the site on both debitage and artifacts may represent a local cobble industry. Tool maintenance is reflected by the large percentage of retouch-trimming flakes. However, as noted above, the effects looters may have had on the site may result in a skewed interpretation.

INTERSITE ANALYSIS

The intersite analysis between Carbed Rock, Copperhead Acres, Gray, Magnolia Spring, Rocky Hollow and Shangri-La Shelters focuses on three problem domains: (1) environmental setting, (2) debitage analysis, and (3) artifact assemblage.

Environmental Setting

Jochim, in his analysis of rock shelters in West Germany, proposes that a linear arrangement of four catchments is the "least-effort arrangement" (see especially Jochim 1976: 131, Fig. 36). Flannery (1976) also discusses the advantages of linear systems based on stream drainages. In the present analysis we consider the linear arrangement based on stream drainages. Table 18 tabulates proximity to water and stream rank (Strahler 1957). Four of the six shelters are on intermittent, first order streams. Magnolia Spring and Shangri-La Shelters are beside permanent, fourth order streams. Gray Shelter is the farthest from permanent water: 2.5 km, or 1.5 miles. Since the two shelters are on permanent streams, Gray Shelter brings the mean distance to permanent water for the remaining four shelters to 1 km, or .6 mile. Copperhead Acres and Rocky Hollow Shelters are most similar with respect to this aspect of environmental setting. The advantages of nearness to a variety of stream ranks are numerous. Vegetation, aquatic species, and fauna - particularly deer, raccoon, and turkey - vary according to stream rank.

Table 18

Environmental setting variables

	opens	stream rank at site	distance to permanent water	stream rank	distance to major water (in miles)	stream rank	elevation (in feet)
Magnolia Spring	SW	4	at	4	1	5	720
Shangri-La	NW	4	at	4	5 1/2	5	800
Copperhead	S	1	1/3	4	2 1/2	5	776
Gray	W	1	1 1/2	4	3 1/2	5	830
Carved Rock	N	1	1/3	4	6 1/2	5	800
Rocky Hollow	W	1	1/4	3	2	5	830

Several relationships between shelters are observed. Figure 8 illustrates the relationship between Magnolia Spring and Gray Shelters. Gray Shelter, on an intermittent tributary of Salt Creek, is 4 km, or 2.5 miles north of Magnolia Spring Shelter. These may represent seasonal occupations by one group. Their location is probably related to nearby food resources.

Carved Rock and Shangri-La Shelters (Figs. 13 and 16) are in similar settings. Carved Rock Shelter is on the south side of an intermittent creek: the aquatic faunal remains found there are suggestive of a spring occupation. Shangri-La is on the north bank of Little Monegaw Creek just 1.6 km, or one mile south of Carved Rock Shelter. These may also relate to a seasonal occupation system.

Copperhead Acres Shelter is not near any of the other small sites reported herein: it is .8 km, or one half airline mile southeast of Bryant Cave, 23SR141. Bryant Cave, in the words of its owner, is large enough that a pickup truck can be turned around in it. This large shelter is 2.4 km, or 1.5 miles from Copperhead Acres along the intermittent creek. Bryant Cave contains a total chipped stone tool assemblage of scrapers, bifaces, projectile points, drills, gravers, blades, knives, and cores. Prehistoric ceramics include clay-, limestone-, and shell-tempered sherds. Both plain and cord marked surface treatments are present. One hearth and a large storage pit containing charred beans were also recorded. Bryant Cave has all of the qualifications (Brose and Epprentis 1973) of a permanent habitation site. Copperhead Acres may be an outlying camp related to Bryant Cave: it may, for example, be a gathering substation. Copper-

head Acres is much closer to permanent water. In the past, the channel of Turkey Creek may have been as close as .4 km, or .25 mile to Copperhead Acres. This would have been an ideal gathering, fishing, and hunting spot. Foods could be easily consumed here or transported to Bryant Cave.

Like Copperhead Acres, Rocky Hollow Shelter stands alone on the south bank of an intermittent creek, .4 km from a permanent waterway. It is 4 km, or 2.5 miles, in a direct line from Lutz Bluff, a large shelter. Although many small tributaries are near Rocky Hollow, no other shelters are nearby.

Debitage

The raw counts and percentages of complete flakes from the six shelters are presented in Table 19 (miscellaneous debitage has been excluded from this discussion). Overall, the classes of flakes represented are similar among all six sites. Only Shangri-La lacks primary flakes. The test pits dug inside Carved Rock Shelter produced no primary flakes. The outside debitage from Rocky Hollow will be excluded from the following analysis since it only has eight whole flakes. Although the raw numbers of flake classes differ, overall the percentages are similar between all six shelters. In sequential order of magnitude the flake classes rank: primary decortication, secondary decortication, interior flakes, and trimming-retouch flakes for all six shelters.

Three shelters stand out as having relatively high percentages of primary and secondary flakes. These are Rocky Hollow, 10.9%; Copperhead Acres, 12%; and Magnolia Spring Shelter, 20%. All of the shelters are near streams or intermittent creeks. The close proximity to creek cobbles would be advantageous for chipped stone tool manufacture, and the high percentages of cortex debitage at these sites is suggestive of a cobble industry. Why these three sites have less cortex debitage than any of the other shelters is uncertain.

With respect to flake quantity inside the shelter and on the slope, the shelters are divided. Magnolia Spring, Shangri-La, and Carved Rock shelters all have more debitage on the slopes than in the shelter proper. This abundance may be explained in several ways. Shelter inhabitants may have preferred to work on the slopes

TABLE 19

Debitage counts and percents for all rock shelters

Inside shelter	Magnolia Spring		Shangri-La		Copperhead Acres		Gray		Carved Rock		Rocky Hollow	
	total	%	total	%	total	%	total	%	total	%	total	%
Primary decortication	1	.6	0	0.0	2	1.3	4	1.2	0	0.0	14	1.8
Secondary decortication	30	19.0	5	8.7	10	6.5	11	3.4	4	5.1	69	8.8
Interior flakes	30	19.0	13	22.8	30	19.5	119	37.0	30	38.5	229	29.3
Trimming-retouch flakes	99	61.9	39	68.4	112	72.7	187	58.3	44	56.4	469	60.0
Outside shelter												
Primary decortication	27	5.6	0	0.0	3	4.5	1	.8	4	1.9	2	25.0
Secondary decortication	74	15.4	2	2.8	10	15.2	1	.8	4	1.9	1	12.5
Interior flakes	137	28.5	19	26.7	19	28.8	32	24.8	71	33.0	1	12.5
Trimming-retouch flakes	243	50.5	50	70.4	34	51.5	95	73.6	136	63.2	4	50.0

where more light was available. Alternatively, debitage could have been swept out of the shelter.

Copperhead Acres, Gray, and Rocky Hollow, all situated along first order streams, exhibit more debitage on the shelter interior than on the slope. Rocky Hollow Shelter provided, by far, the most debitage and artifacts because the two areas A and B, rather than two test pits, were sifted. Assuming the material inside Rocky Hollow had not been disturbed, was randomly distributed, and two 1 x 1 m test pits had been excavated, unearthing only 5.7% of the interior floor, 45 flakes would have been recovered. If Rocky Hollow had been undisturbed, its debitage would rank as lowest among all shelters. However, because the disturbed areas were screened, more material was recovered. Several explanations to account for the abundance of debitage inside the shelter are offered. First, stone tool manufacture may have taken place inside the shelter. Second, retouching may have taken place beneath the shelter overhang. Third, regular gathering, processing, and maintenance may have taken place inside the shelter. Lastly, the flakes may simply not have been swept out of the shelter because the last inhabitants were not returning or they were not interested in sweeping out the shelter.

Overall, the most similar percentages of all six shelters are the slopes of Magnolia Spring and Copperhead Acres.

Artifact Classes

High angle scrapers, low angle scrapers, bifaces, projectile points, and cores are represented at all six

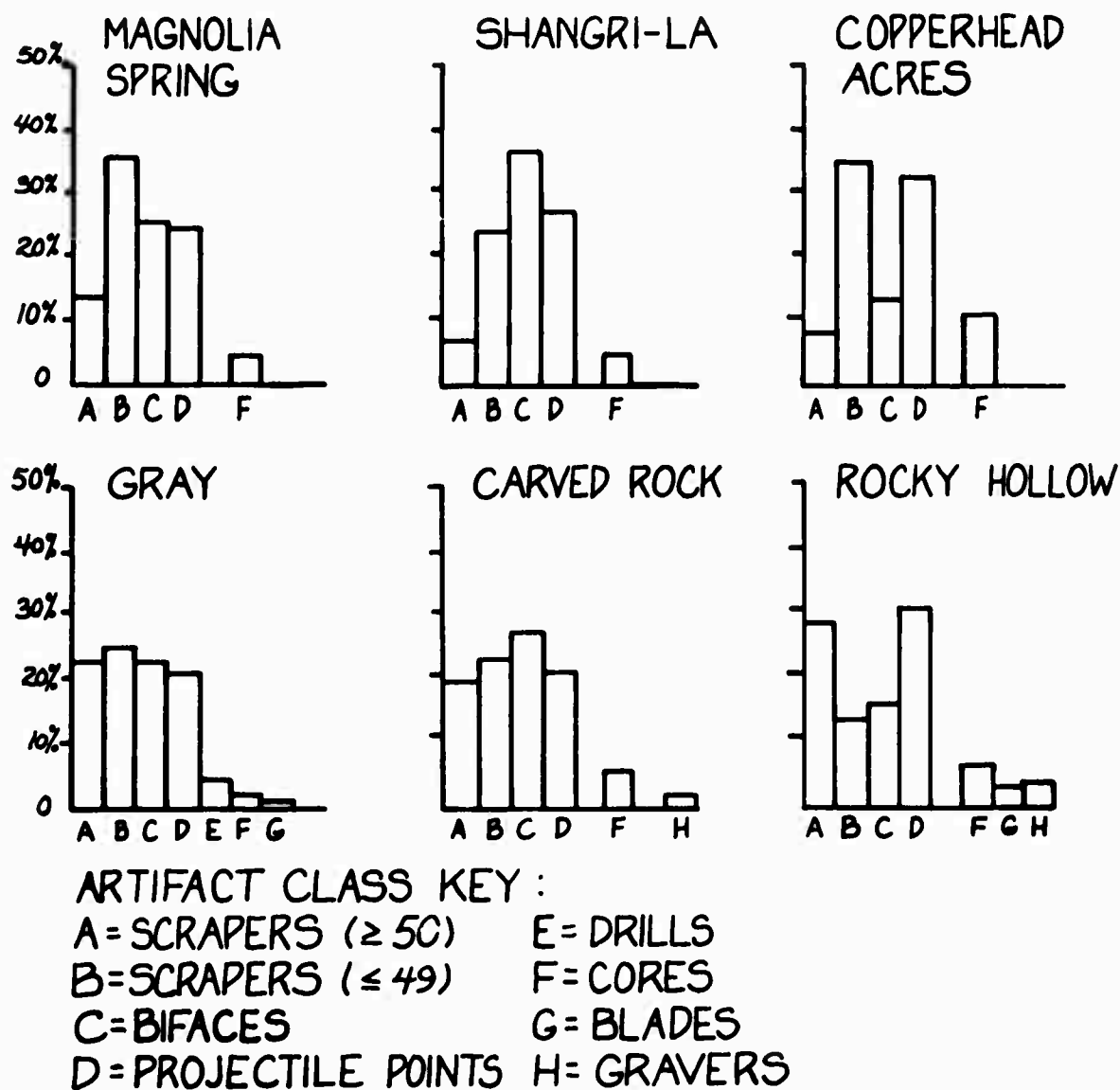


Figure 21. Histogram of chipped stone tools at the six shelters.

shelters (see Fig. 21). No artifact class at any of the shelters is greater than 40% of the chipped stone tool assemblage. In fact, few make up more than 30% of any collection. Magnolia Spring, Shangri-La, and Copperhead Acres all have one or more artifact classes composing more than 30% of the assemblage. The first two are both on fourth order drainages. Gray and Carved Rock, both along first order streams appear most similar of all six shelters. They both exhibit relatively equal numbers of high angle scrapers, bifaces, and projectile points.

Three shelters (Gray, Carved Rock, and Rocky Hollow), all on first order streams, have specialized tools including drills, blades, and gravers. These may be present due to sampling or to curating behavior. Presence of these tools may represent specialized activity.

In summary, the two most similar shelters are Magnolia Spring and Shangri-La. Both are on fourth order streams, open to the west, have more debitage on the slope than on the interior, and have the most similar artifact class percentages.

CONCLUSIONS

In this last section two main ideas are discussed. First, we argue that the six small shelters tested in St. Clair County are short term habitation sites. This argument is based primarily on the total tool assemblage. Second, we present an interpretation of on site chipped stone tool manufacture represented at these small rock shelters.

We first define what we mean by the phrase "short term habitation site." We do not believe that these sites were used for many months; rather, they were used by family units for short periods of time ranging from several days to perhaps a month or more. Binford (1978), in his Nunamiut Eskimo study, describes a variety of special purpose locations, including hunting camps, fish camps, trapping camps, and hunting stands. The small rock shelters reported here appear to represent more activities than simply hunting or other specialized activities. Jelinek (1976: 21) argues that

The presence of exhausted and broken tools on sites, along with strong evidence of lithic manufacture, is generally taken to indicate a wider range of activities than a simple manufacturing station. We believe that this argument applies to the six shelters discussed here. Roper (1977: 91), in her analysis of sites along the Sac River just south of the study area, argues that several sites are "base camps" or "villages." This assessment is based on

a large number and variety of tools and debris, representing a variety of cutting, scraping, processing, and manufacturing tasks (Roper 1977: 91).

The site definitions proposed by Brose and Essenpris (1973: 69-70) are of interest here. Village sites are defined by the presence of tools indicative of male and female activities, midden, and hearths. Activities by females are probably represented by

Knives, steep retouch scrapers, heavy scrapers, drills and/or perforators, manos, pestles...shell ...and ceramics (Brose and Essenpris 1973: 70).

Small family camps, more applicable to our discussion here, are defined by the presence of tools indicative of both male and female activities, and the near absence of hearths and storage pits.

Rock shelters in the Truman Reservoir area are situated ideally with respect to three variables: fuel, food, and water. Most shelters are near creeks which provide fresh water, abundant aquatic resources, and numerous saplings along the banks. Additionally, fuel resources including oak, hickory, and pine grew beside and above all of these shelters. These same trees would provide nut foods. Deer, raccoon, and turkey, all commonly found in faunal assemblages from Ozark rock shelters (Cleland 1960), thrive on oak mast. Succulents and scrub bordering the creeks are also ideal browsing areas. Although the animals may have been startled by activities of peoples living at the shelters, they could be found nearby, farther down the stream valleys.

During our excavations we found that the shelters were generally 10-15° cooler than the outside temperature. With the nearby fresh water, timber, and game, the shelters would have been cool and ideally situated with respect to subsistence resources.

Archeological Evidence

The total artifact assemblages from all six shelters represent a wide variety of activities including both male and female activities. Tools present at all sites include cores, both high and low beveled scrapers, lateral edge flake scraper/knives, biface, projectile points, and broken tools. Varying quantities of specialized tools, including gravers, drills, modified blades, and knives are present. Additionally, all four classes of debitage were recovered from the six shelters. In addition to chipped stone tools, abraders, and nutting stones, the shelters also yielded pottery.

The projectile point, projectile point/knives, low or acute beveled scrapers, cores, debitage, and abraders are indicative of male oriented activities. These include chipped stone tool manufacture, hunting, and butchering. Drills and gravers may be from either male or female tool kits.

Women's tool kits are represented by the high angle or obtuse angle scrapers, nutting stones, and pottery. Briuer (1976) discusses the methods of analysis used to identify the types of residue found on lithic tools. Most of his scrapers were obtuse and these retained plant residue of "non-grass, often woody plants, probably yucca and cholla," (Briuer personal communication). Likewise, Gould (1971: 162) argues that his micro-adzes were used for woodworking. Most adzes (Gould 1971: 161) have obtuse working edges. McMillan (1971: 145), and Ahler and McMillan (1976: 175) in their functional analyses of scrapers from one of the most intensively analyzed

sites in the Truman Reservoir area, Rodgers Shelter, define scrapers as having "beveled edges." Ceramic counts were tabulated from the site catalogues, as the ceramic analysis was conducted by Lisa Carlson in Columbia, Missouri (see Carlson, Vol. V).

The debitage, including primary decortication, secondary decortication, interior, and retouch trimming flakes, is indicative of on-site, chipped stone tool manufacture. Figure 22 is an interpretation of chipped stone tool manufacture at these small rock shelters. Although tools are found in the archeological context, their entry into the record is slower than the entry of debitage. The abundance of cortex on the flakes and tools from these shelters, in combination with the broken cobbles which were included in the miscellaneous debitage category, suggest that most tools were made from chert cobbles from nearby creek beds.

The ratios of bifacially worked tools to waste flakes also support the argument that chipped stone tool manufacture was conducted at these small rock shelters. White and Peterson (1969) argue that ratios of 1:25 and 1:33 are indicative of on site manufacture. Newcomer (1971), in his experimental hand axe manufacture data, found that an average of 50 flakes were produced in making one biface. The bulk of the bifacially worked tools (particularly projectile points) are small, especially the Cahokia and Scallorn points representative of Mississippian occupations; 50 flakes per biface therefore seems high. Since these points are usually made from small, thin flakes that have only minor bifacial retouch, we have subtracted the first 20 flakes removed, because these are mainly

primary and secondary decortication flakes. At the six shelters reported here, the averages of the bifacially worked tool to flake ratios are all above those limits set by White and Peterson (1969) and our adaptation of Newcomer's (1971) results. The averages of these ratios range from the low ratios at Shangri-La Shelter, from inside the shelter 1:24.5 and outside 1:33.63; to high ratios at Copperhead Acres with the shelter interior averaging 1:82 and the exterior 1:84.

Figure 22 illustrates an impression of on-site chipped stone tool manufacture. First, cobbles are located and an initial flake or flakes are knocked off to check the quality of the stone. We propose that the cobbles were then carried back to the shelter. Primary decortication, secondary decortication, and interior flakes were then removed from the cobble cores. These flakes were then used for uniface or biface tools. In terms of unifaces Gould (1971: 161) observes that

they arise fortuitously as the outcome of a choice by the stoneworker to employ either a distal or lateral edge of the flake as the working edge. Any flake with a suitable working edge may be used in this manner, so the choice by the stone-worker is not based on any previous planning...

Unifaces from the test excavations reported here include distal, proximal, and side scrapers; and lateral edge flake/scrapper knives. During use, manufacture, or repair small retouch-trimming flakes may be deposited on the site. These tools are used, broken, and discarded; or simply used and discarded. From Gould's observations it appears that most of these uniface tools are made with

Figure 22

FLOW DIAGRAM OF CHIPPED STONE TOOL MANUFACTURE AT SMALL ROCK SHELTER SITES

SELECTION OF CREEK COBBLES OR OUTCROP QUARRYING

PRIMARY FLAKING TO CHECK FOR INTERNAL QUALITY

PRIMARY FLAKING
PLATFORM PREPARATION

CORES

PRIMARY
SECONDARY } FLAKES
INTERIOR

DISCARD

BLANKS

RETOUCH-TRIMMING FLAKES

PREFORMS

RETOUCH-TRIMMING FLAKES

PRIMARY REFUSE

USE
MAINTENANCE/MODIFICATION
RETOUCH-TRIMMING FLAKES

SECONDARY REFUSE

FLAKE TOOLS

DISCARD

PRIMARY REFUSE

MAINTENANCE/MODIFICATION
RETOUCH-TRIMMING FLAKES

BREAKAGE/ABANDONMENT

SECONDARY REFUSE

PRIMARY FLAKING TO CHECK FOR INTERNAL QUALITY

ease and therefore were not curated. They may be dropped at the place of use, appearing in the archeological record as primary refuse; or tossed away from the area of use, appearing as secondary refuse.

Looking at the left side of the diagram we see the production of bifacially worked tools. Blanks are selected from a variety of flakes, preforms are chipped, and tools are made. Debitage (byproducts of chipped stone tool manufacture) is deposited at the area of manufacture as primary refuse, or it is carried away from the spot where it was manufactured. In the latter case thedebitage would be secondary refuse. Secondary refuse at these small shelters would be expected outside the shelter proper, on the slope, or in a trash dump. Although it is possible that these bifacially worked tools were curated, the availability of lithic material in the form of local chert, creek cobbles, downplays the need for curation. If material was traded in from a distant source, curation would be expected. The lack of curation may explain the great number of complete tools found.

Summary

Six small rock shelters in St. Clair County, Missouri, were tested by the excavation of four 1 x 1 m test squares. A variety of chipped stone tools, ground stone tools, and ceramics was recovered. Thedebitage analysis, as well as the ratio of bifacially worked tool to waste flakes, is indicative of on-site chipped stone tool manufacture. This evidence supports the contention that these shelters served as habitation sites.

As no cultural sequences were present at the shelters, interpretations are difficult. The larger Rice, Gary, and Langtry projectile points may represent Late Archaic occupations. The overwhelming majority of projectile points (or arrowpoints) in the assemblages are Cahokia and Scallorns, representing Mississippian occupations of the Highland Aspect. Carlson (Vol. V) in her ceramic analysis of the entire study area concludes that Plains influences are present. The lack of upland and riverine site data in the area makes an interpretation of the total settlement-subsistence pattern unfeasible at this time.

REFERENCES CITED

Ahler, Stanley A. and R. Bruce McMillan

- 1976 Material Culture at Rodgers Shelter: A
 Reflection of Past Human Activities. IN:
 Prehistoric Man and His Environments: A Case
 Study in the Ozark Highland, edited by W. R.
 Wood and R. B. McMillan. New York: Academic
 Press.

Allen, W. H., and others

- 1975 Quaternary Paleoenvironmental History of the
 Western Missouri Ozarks. Columbia, Mo.:
 23rd Annual Meeting Midwest Friends of the
 Pleistocene, Western Missouri Ozarks Field
 Conference.

Bell, Robert E.

- 1958 Guide to the Identification of Certain
 American Indian Projectile Points. Oklahoma
 Anthropological Society Special Bulletin 1.
1960 Guide to the Identification of Certain
 American Indian Projectile Points. Oklahoma
 Anthropological Society Special Bulletin 2.

Binford, Lewis R.

- 1963 A Proposed Attribute List for the Description
 and Classification of Projectile Points.
 University of Michigan Anthropological Papers
 19: 193-221.
1978 Nunamiut Ethnoarchaeology. New York:
 Academic Press.

Bordes, Francois

- 1968 The Old Stone Age. New York: McGraw-Hill.

Bray, Robert T.

- 1956 Culture-Complexes and Sequences at the Rice Site (23SN200), Stone County, Missouri. Missouri Archaeologist 18(1-2): 26-134.
- 1957 Lander Shelter No. 1, 23SN189, Stone County, Missouri. Missouri Archaeologist 19(1-2): 22-51.

Bretz, J. Harlen

- 1965 Geomorphic History of the Ozarks of Missouri. Missouri Geological Survey and Water Resources, Second Series, Vol. 41.

Briuer, Frederick L.

- 1976 New Clues to Stone Tool Function: Plant and Animal Residues. American Antiquity 41(4): 478-484.

Brose, David S. and Patricia S. Essenpreis

- 1973 A Report on a Preliminary Archaeological Survey of Monroe County, Michigan. Michigan Archaeologist 19(1-2): 1-182.

Calabrese, F. A., Rolland E. Pangborn, and Robert J. Young

- 1969 Two Village Sites in Southwestern Missouri: A Lithic Analysis. Missouri Archaeological Society, Research Series 7.

Chapman, Carl H.

- 1948 A Preliminary Study of Missouri Archaeology, Part 3: Woodland Cultures and Ozark Bluff Dwellers. Missouri Archaeologist 10(3).
- 1954 Preliminary Salvage Archaeology in the Pomme de Terre Reservoir Area. Missouri Archaeologist 16(3-4): 10-113.

- 1965 Carved Rock Shelter, 23SR127 and Gray Shelter, 23SR122, Revisited. IN: Preliminary Archaeological Investigations in the Kaysinger Bluff Reservoir Area, Missouri by C. H. Chapman, A. Grimshaw, W. Klippel, R. B. McMillan, J. Mori, R. E. Pangborn, W. E. Sudderth and R. L. McNair, pp. 404-412. Manuscript submitted to the National Park Service, Omaha.

- 1975 The Archaeology of Missouri, I. Columbia: University of Missouri Press.

Clark, J. D.

- 1977 The Development of Ethnoarchaeology, Part I. Discussant, Society for American Archaeology, 42nd Annual Meeting, New Orleans, La.

Cleland, C. E.

- 1960 Analysis of the Animal Remains in the Prehistoric Ozark Bluff Dwellings of Northwest Arkansas. M.A. Thesis, Department of Anthropology, University of Arkansas

Collins, Michael Bruce

- 1974 A Functional Analysis of Lithic Technology Among Prehistoric Hunter-Gatherers of Southwestern France and Western Texas. Ann Arbor: University Microfilms.

Crabtree, D. E.

- 1972 An Introduction to Flintworking. Occasional Papers of the Idaho State University Museum 28. Pocatello, Idaho.

Crabtree, Don E., and B. Robert Butler

- 1964 Notes on Experiments in Flint Knapping, 1: Heat Treatment of Silica Minerals. Tebiwa 7: 1-6.

Fitzhugh, W. M.

- 1972 Environmental Archeology and Cultural Systems in Hamilton Inlet, Labrador. Smithsonian Contributions to Anthropology 16.

Flannery, Kent

- 1976 The Early MesoAmerican Village. New York: Academic Press.

Gilmore, M. R.

- 1931 Vegetal Remains in the Ozark Bluff-dwellers Culture. The Michigan Academy of Science, Arts and Letters, Papers 14: 83-103.

Gould, R. A.

- 1971 The Archaeologist as Ethnographer: A Case from the Western Desert of Australia. World Archaeology 3: 143-177.

Gould, R. A., D. A. Koster, and A. H. L. Sontz

- 1971 The Lithic Assemblage of the Western Desert Aboriginies of Australia. American Antiquity 36(2): 149-169

Harrington, M. R.

- 1924 The Ozark Bluff-dwellers. American Anthropologist 26: 1-2.
- 1960 The Ozark Bluff-dwellers. Heye Foundation, Museum of the American Indian, Indian Notes and Monographs 12.

Horton, Robert E.

- 1945 Erosional Development of Streams and Their Drainage Basins; Hydrophysical Approach to Quantitative Morphology. Bulletin of the Geological Society of America 56: 275-370.

Jelenik, A. J.

- 1976 Form, Function, and Style in Lithic Analysis.
IN: Cultural Change and Continuity, edited by
Charles Cleland. New York: Academic Press.

Jochim, Michael A.

- 1976 Hunter-Gatherer Subsistence and Settlement:
A Predictive Model. New York: Academic Press.

King, James E.

- 1973 Late Pleistocene Palynology and Biogeography
of the Western Missouri Ozarks. Ecological
Monographs 43(4): 539-565.

Klippel, W.

- 1971 Prehistory and Environmental Change Along the
Southern Border of the Prairie Peninsula
During the Archaic Period. Ann Arbor:
University Microfilms.

Marshall, Richard A.

- 1958 The Use of Table Rock Reservoir Projectile
Points in the Delineation of Cultural Com-
plexes and their Distribution. M.A. Thesis,
Department of Sociology and Anthropology,
University of Missouri.

McCracken, M. H.

- 1961 Geologic Map of Missouri. Geological Survey
of Missouri.

MacDonald, G. F.

- 1968 Debert: A Paleo-Indian Site in Central Nova
Scotia. Anthropology Papers 16, National
Museums of Canada. The Queen's Printer, Ottawa.

McMillan, R. Bruce

- 1971 Biophysical Change and Cultural Adaptation at Rodgers Shelter, Missouri. Ph.D. dissertation, University of Colorado, Boulder.

Miner, Horace

- 1950 Cave Hollow, An Ozark Bluff-dweller Site. University of Michigan Museum of Anthropology Papers 3.

Nance, John

- 1975 The Gentle Tasaday. New York: Harcourt, Brace, Jovanovich.

Newcomer, M. H.

- 1971 Quantitative Experiments in Hand Axe Manufacture. World Archaeology 3(1): 85-93.

Purdy, B. A.

- 1971 Thermal Alteration of Silica Minerals: An Archaeological Approach. Ph.D. Dissertation, University of Florida-Gainesville.

Rathje, William L.

- n.d. Modern Material Culture Studies Myths and a Manifesto. Ms. in preparation by the author.

Roper, D. C. and M. P. Piontkowski

- 1977 Projectile Points. Cultural Resources Survey, Harry S. Truman Dam and Reservoir, Vol. V, Lithic and Ceramic Studies, American Archaeology Division, University of Missouri-Columbia.

Schiffer, Michael B.

- 1976 Behavioral Archeology. New York: Academic Press.

- Segelquist, C. A., F. D. Ward, R. G. Leonard
 1969 Habitat-deer Relations in Two Ozark Enclosures. Journal of Wildlife Management 33: 511-520.
- Segelquist, C. A. and W. E. Green
 1968 Deer Food Yields in Four Ozark Forest Types. Journal of Wildlife Management 32: 330-337.
- Semenov, S. A.
 1976 Prehistoric Technology. New York: Barnes and Noble.
- Smith, B. D.
 1975 Middle Mississippian Exploitation of Animal Populations. Anthropology Papers, Museum of Anthropology, University of Michigan 57. Ann Arbor.
- Steyermark, Julian A.
 1959 Vegetational History of the Ozark Forest. University of Missouri Studies, Columbia, Mo.
- Strahler, Arthur N.
 1957 Quantitative Analysis of Watershed Geomorphology. Transactions, American Geophysical Union 38(6): 913-920.
- Wedel, Waldo R.
 1943 Archaeological Investigations in Platte and Clay Counties, Missouri. United States National Museum, Bulletin 183.
- White, A. M.
 1963 Analytic Description of the Chipped-stone Industry from Snyders Site, Calhoun County, Illinois. Anthropology Papers, Museum of Anthropology, U. of Michigan 19, pp. 1-70.

White, Carmel and Nicolas Peterson

- 1969 Ethnographic Interpretations of the Prehistory of Western Arnhem Land. Southwestern Journal of Anthropology.

Wilmsen, Edwin N.

- 1970 Lithic Analysis and Cultural Inference: A Paleo-Indian Case. Tucson: University of Arizona Press.

Wood, W. Raymond

- 1961 The Pomme de Terre Reservoir in Western Missouri Prehistory. Missouri Archaeologist 23: 1-131.
- 1968 Mississippian Hunting and Butchering Patterns: Bone from the Vista Shelter 23SR20, Missouri. American Antiquity 33(2): 170-179.

Wood, W. Raymond and R. Bruce McMillan

- 1976 Prehistoric Man and His Environments: A Case Study in the Ozark Highland. New York: Academic Press.

Wright, H. E., Jr.

- 1971 Late Quaternary Vegetational History of North America. IN: The Late Cenozoic Glacial Ages, pp. 425-464. K. K. Turekian, editor. New Haven: Yale University Press.

Yellen, John E.

- 1977 Archaeological Approaches to the Present. New York: Academic Press.